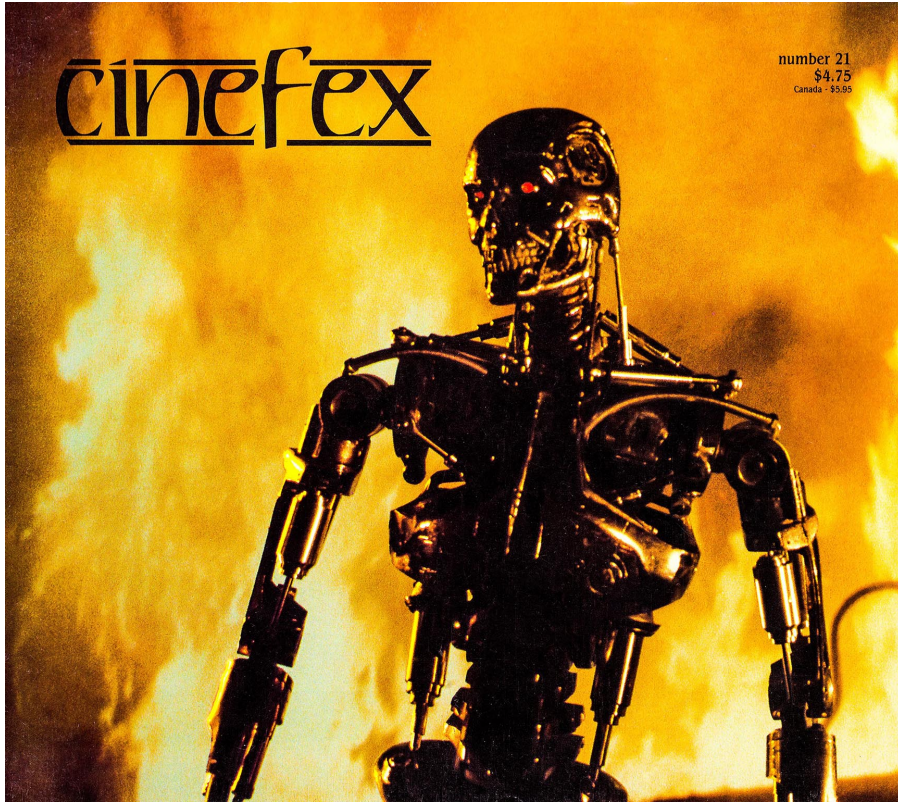


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The Terminator 4

When writer-director James Cameron first conceived of *The Terminator*, it was little more than a visceral image of a human cyborg emerging from a fire in its basic skeletal form. What it became was a modestly-budgeted blockbuster. To bring his image to life, Cameron engaged the services of Stan Winston—whose seasoned team of makeup and mechanical effects experts created the full-size robotic skeleton, as well as several lifelike representations of actor Arnold Schwarzenegger. For futuristic post-holocaust views of Los Angeles, plus contemporary pyrotechnics and stop-motion effects, the expertise and talents of *Fantasy II* were brought to bear. With minimal funds, but a wealth of creativity and enthusiasm, *The Terminator's* effects units helped transform Cameron's searing image into both a thrill-a-minute adventure and a major box-office event. *Article by Jennifer Benidt.*

The Shape of 'Dune' 24

Despite enormous popularity as a novel, twenty years would elapse before Frank Herbert's *Dune* would make the quantum leap from printed page to cinematic reality. The imposing challenge of adapting the widely-read cult classic—a saga rivaling the novel itself in epic proportion—would ultimately be met by writer-director David Lynch. In consort with cinematographer Freddie Francis, production designer Tony Masters, and a battery of high-powered effects supervisors including Carlo Rambaldi, Albert Whitlock, Barry Nolan, Kit West and Brian Smithies, Lynch would labor diligently for three-and-a-half years to bring his vision of Herbert's exotic work to life. From the worm-infested deserts of Arrakis to the murky decadence of Giedi Prime, Lynch and his production unit combined a wealth of experience with fresh innovation to weave the richly-textured tapestry of *Dune*. *Edited by Janine Pourroy and Don Shay.*

FRONT COVER — A cyborg endoskeleton emerges from the flames in *The Terminator*.
A spice harvester scours the sands of Arrakis in *Dune* — BACK COVER.

A movie poster for 'The Terminator'. The image is a close-up of a Terminator robot's face, which is covered in blood and has a menacing expression. The lighting is dramatic, with the robot's face illuminated against a dark background. The title 'THE TERMINATOR' is written in large, bold, red capital letters at the bottom of the image.

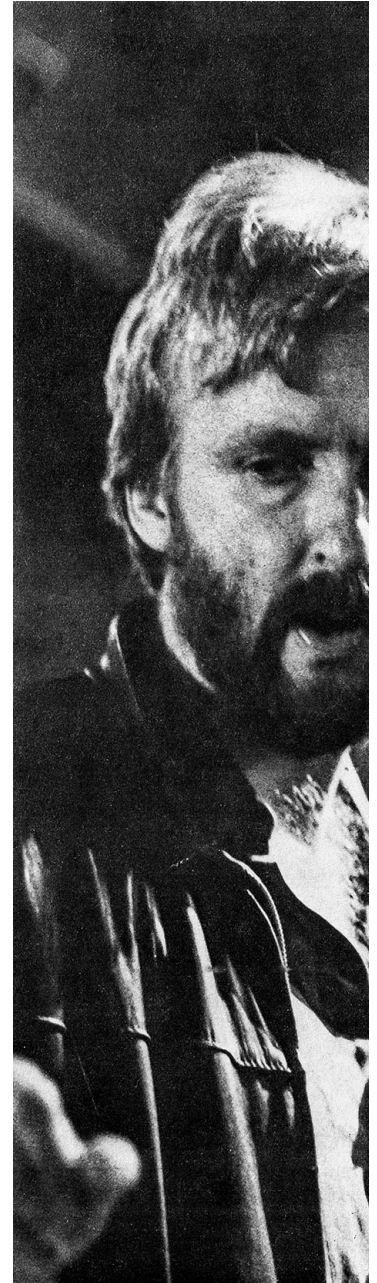
**THE
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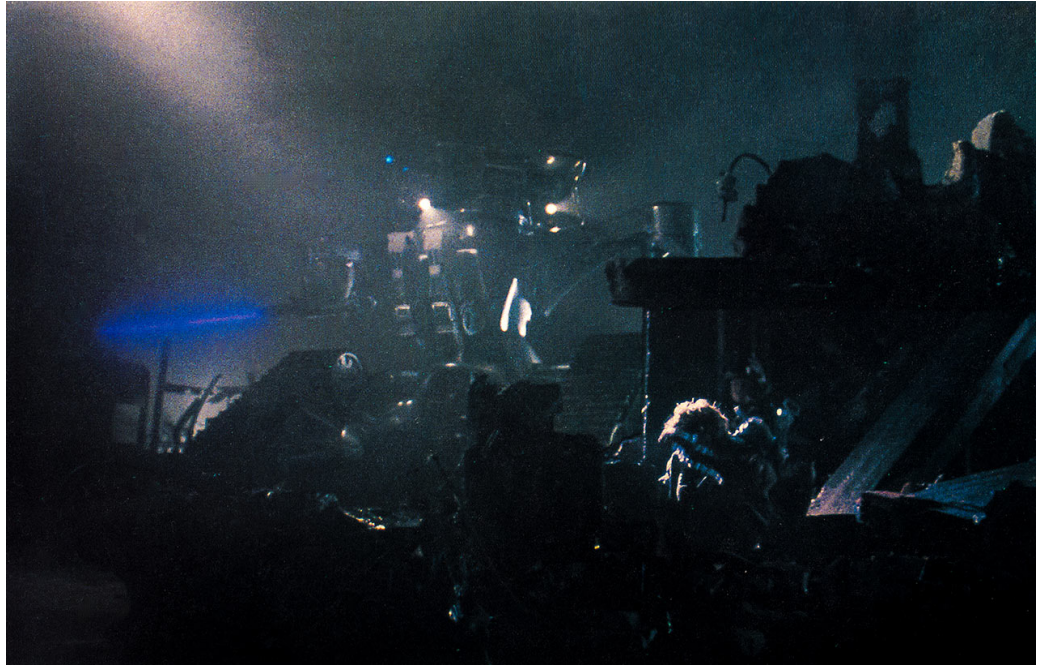
A desperate battle for the future of mankind takes place in contemporary Los Angeles in The Terminator, written and directed by James Cameron. / By 2029, Los Angeles is little more than a sprawling plain of post-holocaust rubble — patrolled by sentient machines determined to wipe out the last vestiges of humanity. Prowling the night skies overhead are flying Hunter-Killer machines, armed with high-intensity searchlights and laser weapons. / Resistance fighters evade a Hunter-Killer tank — part of an elaborate tracking shot involving four separate live-action and miniature film elements rear-projected into a miniature foreground setting. / From this grim future world, an indestructible cyborg Terminator (Arnold Schwarzenegger) is sent into the past to assassinate the young woman who will give birth to mankind's only hope for survival. On his

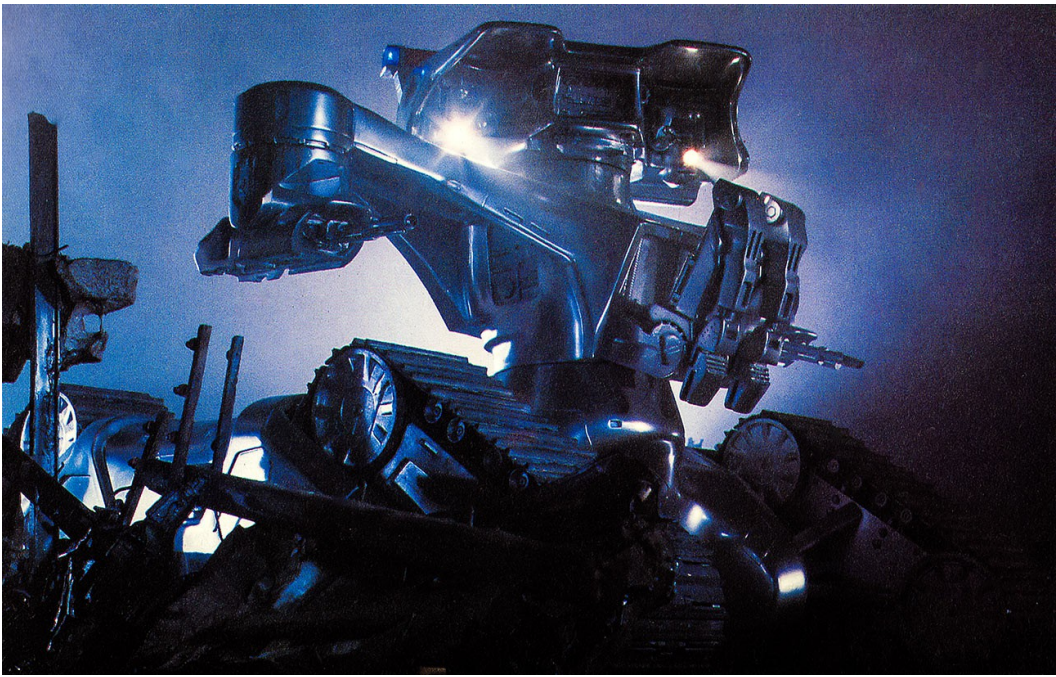
tion between miniatures and live-action characters.

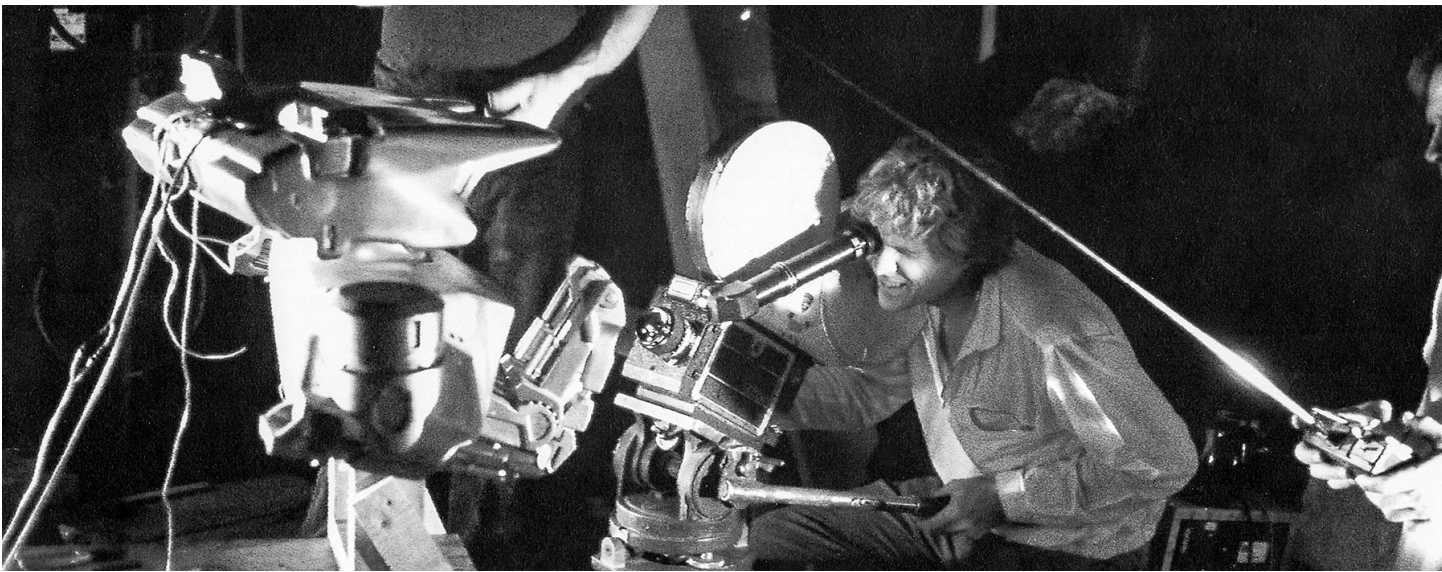
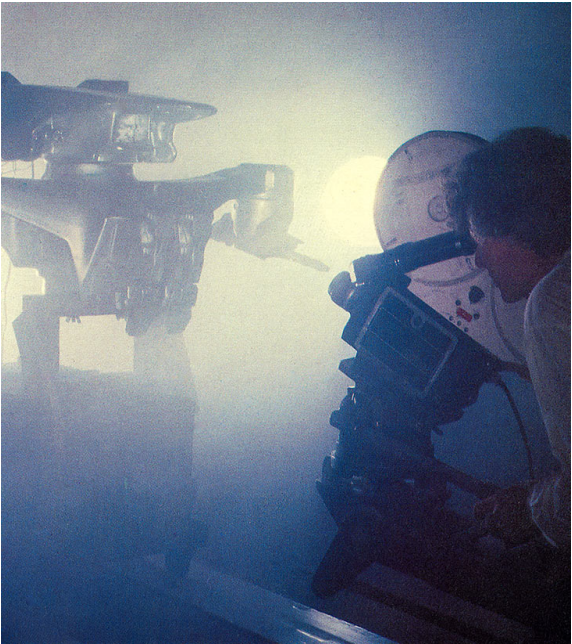
Principal among the menacing machines were 'Hunter-Killer' tanks and aircraft. The 'hero' tank, four feet long and weighing two hundred pounds, was constructed by Fantasy II model shop supervisor Michael Joyce. "I built it the way we filmed it," said Joyce, "from the bottom up. The first thing you see in the film is just the tread moving through the rubble. Then as Reese keeps flashing back, you see more and more of it. So I built the lower chassis and the wheels first. The bottom part of the tank was cast from a fiberglass, four-piece interlocking mold, and the chassis was aluminum, with all four of the treads on it. There were two 90-volt one-horsepower motors in each of the front treads, and 96 wheels on the tank, all spring-loaded so that when they ran over the debris it would work like a real tank. We built the main part out of foam and covered it with Presstex, which gives it a smooth finish. The upper part of the tank was radio-controlled. Its guns used four channels of the radio, and had axes that moved up and down and left and right. We had flashcubes inside the barrels to act as point sources for the lasers, which were added optically. The tank's head used three channels of another radio. It turned back and forth, and its searchlights were two 600-watt high-intensity quartz projector lights." In addition to the primary 'hero' tank, several undetailed spares were produced for the future flashback in which Reese and his commando team destroy one of the rumbling monsters. These and other miniature explosions in the film were engineered by veteran pyrotechnician Joe Viskocil.

While Hunter-Killer tanks prowl the urban ruins ferreting out human victims, flying Hunter-Killers patrol the dark skies overhead. The basic shape of the three-foot flying machine, carved in foam and cast by modelmaker Gary Rhodaback, was detailed and outfitted by Paul Kassler with radio-controlled searchlights, running motors and landing gear. As with the tank shots, all the miniature flying scenes were created in heavy smoke environments using single-pass, non-motion control techniques. "When the runs were straight," said Gene Warren, "we had a tubular track that hung on the ceiling, with a carriage on it and another rig that came down so the model could be suspended on wires. For more elaborate kinds of moves, however, we used a Chapman crane with an operator sitting on top who could swivel and turn and tilt the model while it was arcing through the scene. Internal lighting proved to be a major difficulty, since we were shooting our high-speed miniatures 'live' on the set. Running lights and lights that blink or illuminate the interior are not generally a problem, although you do have to run them at a fairly high intensity. But creating searchlights that actually threw a beam through the smoke and lit up the ground was a real challenge because we were shooting high-speed with fairly small models, and so the light levels had to be very bright. What we ended up with were the same 600-watt quartz lights we had









Grim reminders of mankind's cruel destiny line the war-torn streets of Los Angeles. A high-speed miniature shot, this introduction to the film involved pyrotechnics, a rumbling tank (not yet in view) and a forced-perspective foreground setup. The trailing skulls, ranging from half- to eighth-scale, were actually positioned only inches apart. Laser beams were inserted optically. / The aerial Hunter-Killer was suspended on wires — either from an overhead track or from a Chapman crane — and physically drawn through a miniature representation of skeletonized skyscrapers. / Street sections were constructed to scale for the tank shots. / Pyrotechnics expert Joe Viskocil prepares to detonate a partially detailed copy of the primary

that positioning — sometimes frame by frame — while compositing the shots on the optical printer. We also shot generic lightning bolts, which I later layered in separate passes on top of the other bolts to create a more frantic and exciting effect."

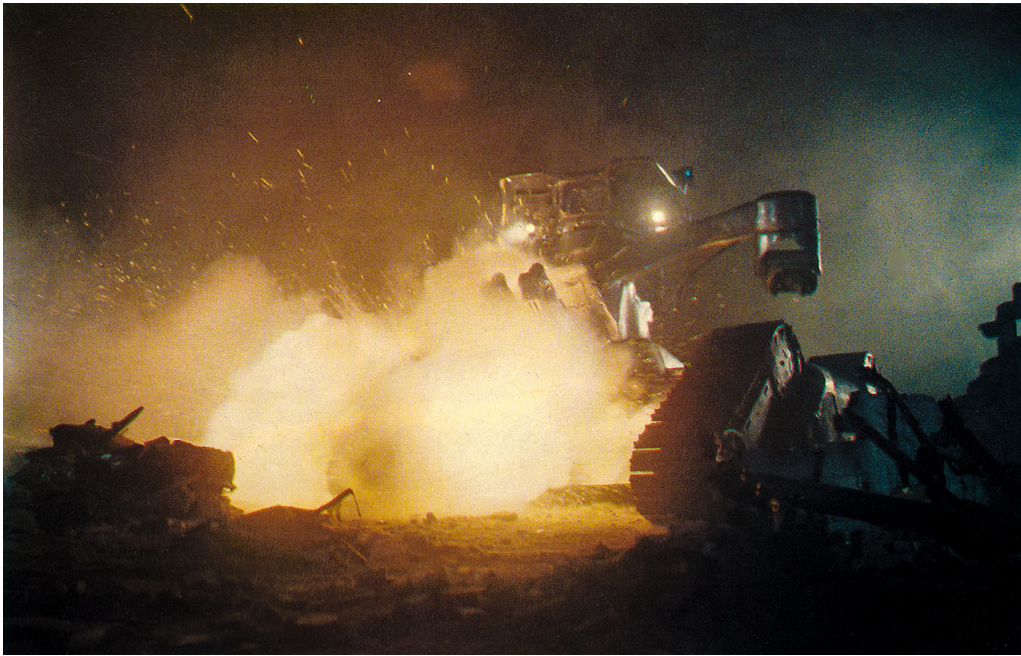
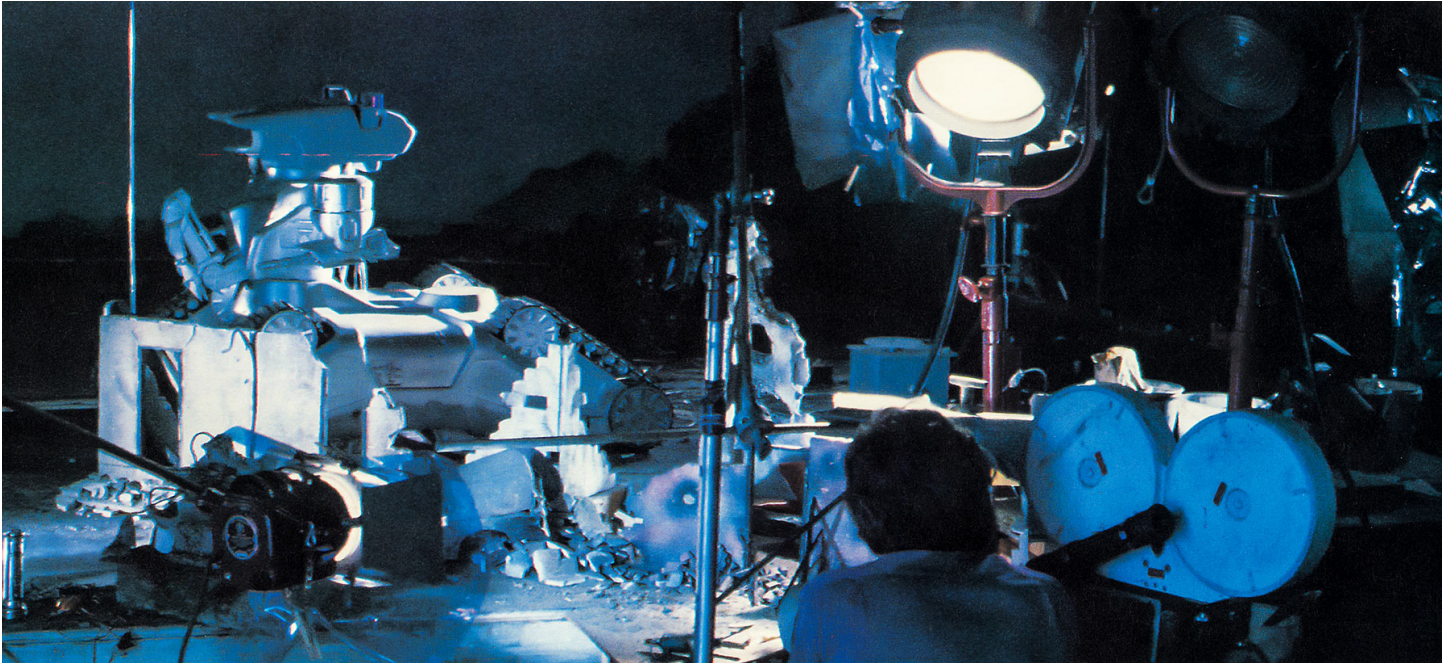
The Terminator is a machine with a mission, dispassionately and methodically stamping out any and all obstacles in his path — from children's toys to nightclub bouncers to a fully-manned police station. Arriving unclothed and unarmed, he promptly rectifies both deficiencies by savaging a trio of punk hoodlums for their clothes and then relieving a gun shop proprietor of both his choicest weapons and his life. When injured, he discards the useless body part as perfunctorily as most people discard their trash.

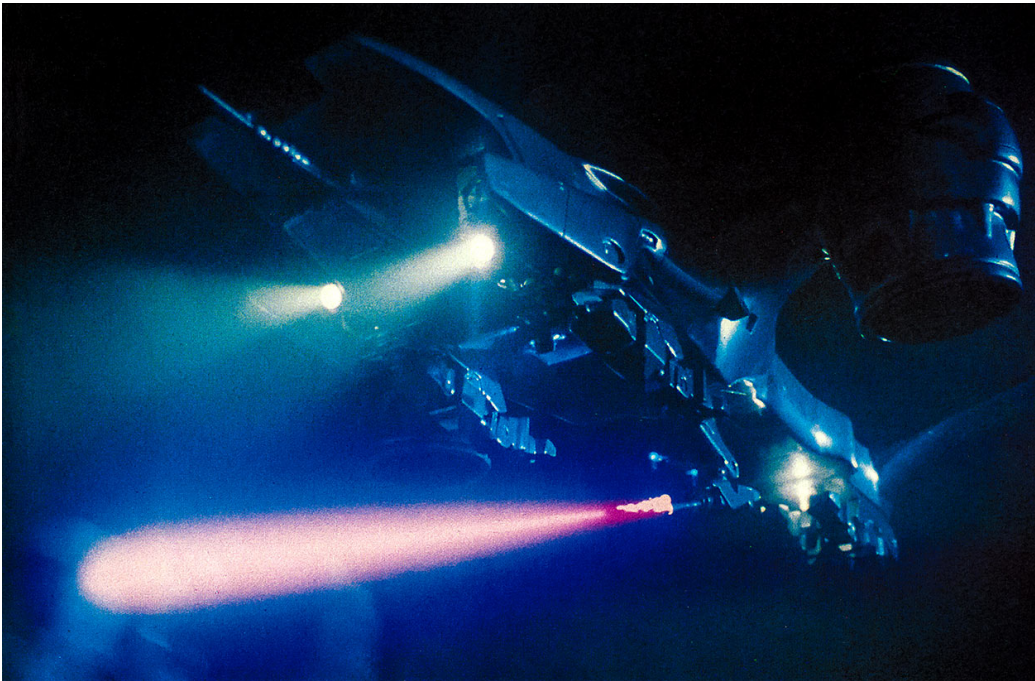
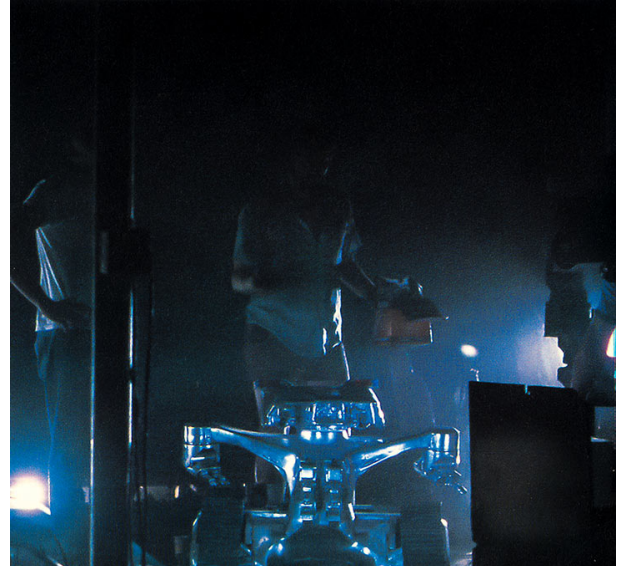
"My initial intent was to do a film like *Alien*," commented Cameron, "which, even though it's a science fiction film, was still done with a sense of very immediate, almost documentary-level realism. The Terminator was going to be a guy with a scary face, but not particularly imposing. I intended for him to be kind of a lurking figure in the crowd, with the collar of his trench coat turned up like a bad guy from *film noir*. But once Arnold was cast, it changed the complexion of the film forever. It never would have worked to do that kind of gritty realism with Arnold in the role. He fills the space, and you have to go with that. You have to make it larger than life and play with it. If you think about it, Arnold really defies logic. He's supposed to be inconspicuous, an infiltrator. But at six-feet two-inches and 220 pounds, he stands out in any crowd. Plus he's got an accent, for which there's no logical justification, but people seem willing to suspend their disbelief.

"In retrospect, it seems strange that casting Arnold Schwarzenegger as the Terminator really hadn't occurred to anybody. His agent had originally wanted him to play Reese, which didn't strike me as appropriate casting. When I met Arnold, it turned out that he really loved the script. In fact, he was the only person I talked to before we started shooting who really believed that this was going to be a big movie. But interestingly enough, as we talked about the script, it turned out that a lot of the scenes he was responding to were Terminator scenes. Suddenly, it occurred to me that he'd make a great Terminator! Arnold has a very powerful facial structure, as well as his physique. We never see his muscles, except in the first scenes, but we know they're there. We get a latent sense of his physical power, which pays off at the end when we see that he was strong even beyond the human strength. Also, if we had used another actor, we would have had to make the hydraulic endoskeleton that much smaller to fit inside him. With Arnold, you can buy the fact that his muscles would have concealed a lot of machinery."

After an unabashed, but unsuccessful, attempt to assassinate Sarah Connor in a crowded nightclub, an ensuing car chase through the streets of Los Angeles ends with the Terminator's







corrective autosurgery. To achieve this, James Cameron and his crew were called upon to produce a fully mechanized representation of James Cameron's head. The first step in the process was to take the actor's facial features with a life cast.

"A life cast is only an impression," says Cameron. "It's an exact likeness. When you're taking a life cast, a certain amount of distortion inevitably takes place. The impression material pulls the face down, creating distortion lines and removing the face's character. To create a duplication of an actor, I use the impression point. I take the impression, then I make a life cast. I then take a series of photographs of the actor, in the expression shot. For example, if the expression is one — as in the case of Arnold — then I take the actor with a blank stare on his face. I then photograph the actor while he's screaming from every conceivable angle, and do the same for the eyes, the nose, the mouth. Once I have the impression, I resculpt the entire face on the clay duplicate. What I'm doing is sculpting the life and the character. The final head I take my final cast from is actually a life cast. It looks exactly like the actor."

"To create the puppet heads, we make a mold of the original sculpture. From that mold, we create a silicone mold in which we then resculpt for each individual character. Once the sculpting is done, more silicone molds are made. We then lay out a thick layer of silicone in a negative mold where we want the skin to be. We lay in a core of Ultracal — which is a type of plaster — and we remove the Ultracal and the clay, and the Ultracal core then fits back inside the void that's the thickness of the clay. We then inject foam rubber into that void to create the puppet head. Next, we make a fiberglass shell, which becomes the actual outer skin. We place whatever mechanics, including teeth and a tongue — and the eyes, the eyelashes and do the final makeup."

Two different puppet heads were created for the movie. The first head was sculpted to look like James Cameron, but the rubber does not move exactly like a real face. It would be very difficult to make a foam rubber head that looked exactly like James Cameron's head.



corrective autosurgery. To achieve this and his crew were called upon to produce an arm, plus a fully mechanized representation of Schwarzenegger's head. The first step in the actor's facial features with a life cast.

"A life cast is only an impression," says Winston, "it's not an exact likeness. When you're taking a life cast, a certain amount of distortion inevitably takes place. The impression material pulls the face down, creating distortion lines and removing the face's characteristic features. To duplicate an actor, I use the impression point. I take the impression, then I make a life cast. I then take a series of photographs of the actor, in the expression shot. For example, if the expression is one — as in the case of Arnold — then I take the actor with a blank stare on his face, and I photograph the actor while he's screaming from every conceivable angle, and do eyes, the nose, the mouth. Once I have the impression, I resculpt the entire face on the clay duplicate. What I'm doing is sculpting the life and the character. The head I take my final cast from is actually a life cast. It looks exactly like the actor."

Makeup artist Stan Winston and his crew were tasked with creating several puppetized representations of Arnold Schwarzenegger.

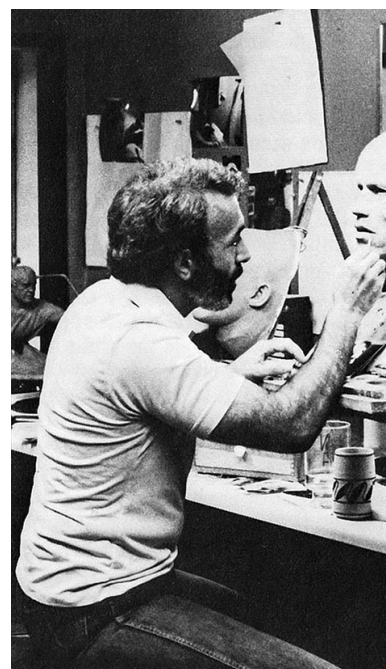
Working with a clay duplicate of a life cast taken directly from the actor, Winston carefully sculpts expression and character lines — often erased or distorted by the impression material — back into the face. / Using Winston's 'corrected' life mask, Tom Woodruff carves into the eye area to produce the basic sculpture needed for the puppet which performs ocular surgery on itself. /

Nearly complete, the Terminator puppet awaits its final coloring and hair. / The finished figure, fully articulated and controlled via cables. / The Terminator also repairs its damaged arm — a duplicate of Schwarzenegger's. While the

— all duplicated in miniature. Joe Viskocil — whose pyrotechnic work has been featured in such productions as *Star Wars*, *The Empire Strikes Back* and *Ghostbusters* — was in charge of executing the blast. "Once the model was finished, they turned it over to me, and I completely cut it up and scored it. For the explosives, I used a combination of small bombs and gasoline. I used forty-one separate charges that were all set off in exactly three-quarters of a second, real time. For dramatic impact, I wanted to go with a full gas tank type of explosion, but in miniature you have to break up the gas as much as possible. When you have a pure gas explosion, the initial flame is very long, so in miniature it would look out of scale. So I broke up the gasoline with sawdust and vermiculite. Then I needed to place the mixture in some sort of containers, and I found that condoms worked very well for that. I put about four ounces of the mixture into each condom, then placed them in plastic cups all over the sides of the tank. I covered the entire inner circumference of the tank with the explosives. We started the explosion in the back, rushing towards the cab of the truck since Reese puts the bomb into the truck's exhaust pipe. The live-action scene that immediately follows the explosion was actually shot before the explosion; and in that scene, the front of the cab is still standing. So I had to make sure that the cab was still standing after my explosion. And it was the only thing that was left standing!"

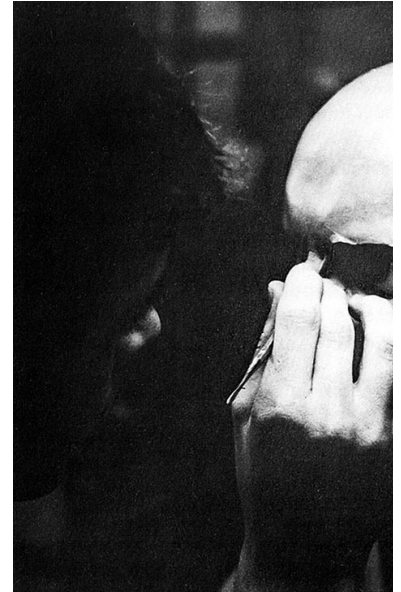
The explosion was shot with three cameras — manned by Gene Warren, Peter Kleinow and John Huneck — all running at 120 frames per second. Unfortunately, the first attempt failed. Since the tanker was being photographed at high-speed, it had to be moving rapidly to compensate for the slow motion effect. The vehicle was designed to be cable-drawn by a motorized drive unit positioned out of frame; but with the added weight of the explosives in the tank section, the connection between the cab and tank was not strong enough to withstand the initial jerk required to get it rolling. As a result, the truck's front axle came off. The bombs detonated as planned, but the truck's wheels were already out in front. So the tanker had to be rebuilt virtually from scratch. What had originally taken two months to set up had to be redone in less than a week. Rhodaback and Joyce were able to salvage most of the cab, and miraculously reconstructed the entire truck in only three days. The vehicle was then rigged with explosives and detonated a second time — with perfect results.

Just as Reese and Sarah begin to believe they have at last stopped the unstoppable, out of the blazing inferno steps the

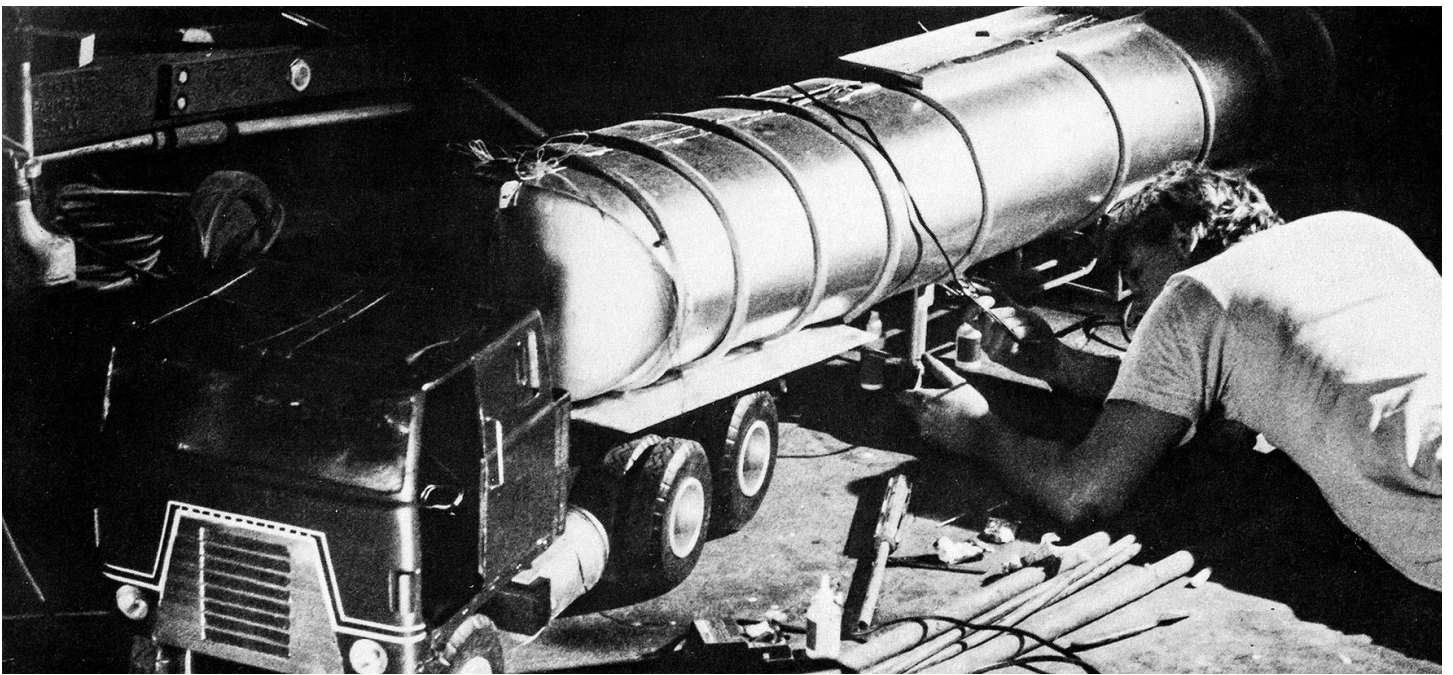


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Although it was Cameron's intent to give Winston creative license in designing the robot, he nevertheless submitted some of his own sketches as points of departure. Winston, however, was so taken with Cameron's concepts that he had no desire to alter them. "Jim happens to be an incredible artist," Winston explained, "which was great for me because most of the time my biggest problem is working with directors who don't have an artistic concept. Usually, I do all my own design work; but in this case there was already a concept that was brilliant, and I didn't want to change it." At Cameron's insistence, however, Winston came up with three variations on the basic theme. In the end, the design reverted back to essentially what the director had at first proposed. The only modification of note is that the final robot is slightly larger and more massive than originally conceived — due in part to the casting of Arnold Schwarzenegger after the film was already in preproduction.

"I wanted to retain Arnold's form in building the robot," said Winston. "Not only is the robot the same height as Arnold, but all of its proportions are scaled down from and matched to fit his. The robot is anatomically correct, and could literally fit inside Arnold's body. Even the robot's skull was scaled down from a clay duplicate of Arnold's head; and its teeth are duplicates of Arnold's. However, since the skull we created was a mechanical one, it is not exactly like a human skull. We had to use some artistic license. Jim's concept of the robot was that it be organic, yet look like a machine."

Constructing the robot was a laborious process taking about six months from start to finish. Winston's multi-skilled crew — consisting of Shane Mahan, Tom Woodruff, John Rosengrant, Richard Landon, Brian Wade, David Miller and Michael Mills — handled the sculpting, moldmaking and even puppeteering, while the machining, metal work and radio control were accomplished by Ellis 'Sonny' Burman, Bob Williams and assistant Ron MacInnes. "Each of the robot parts was originally sculpted in Roma clay," Winston explained, "then molded in gray tuff, which is a polysulfide flexible rubber compound. Plaster copies were then brought out of those molds. The finished work was done on those plaster castings, which were finely sanded to give them a machined look. Then the plaster castings were molded in

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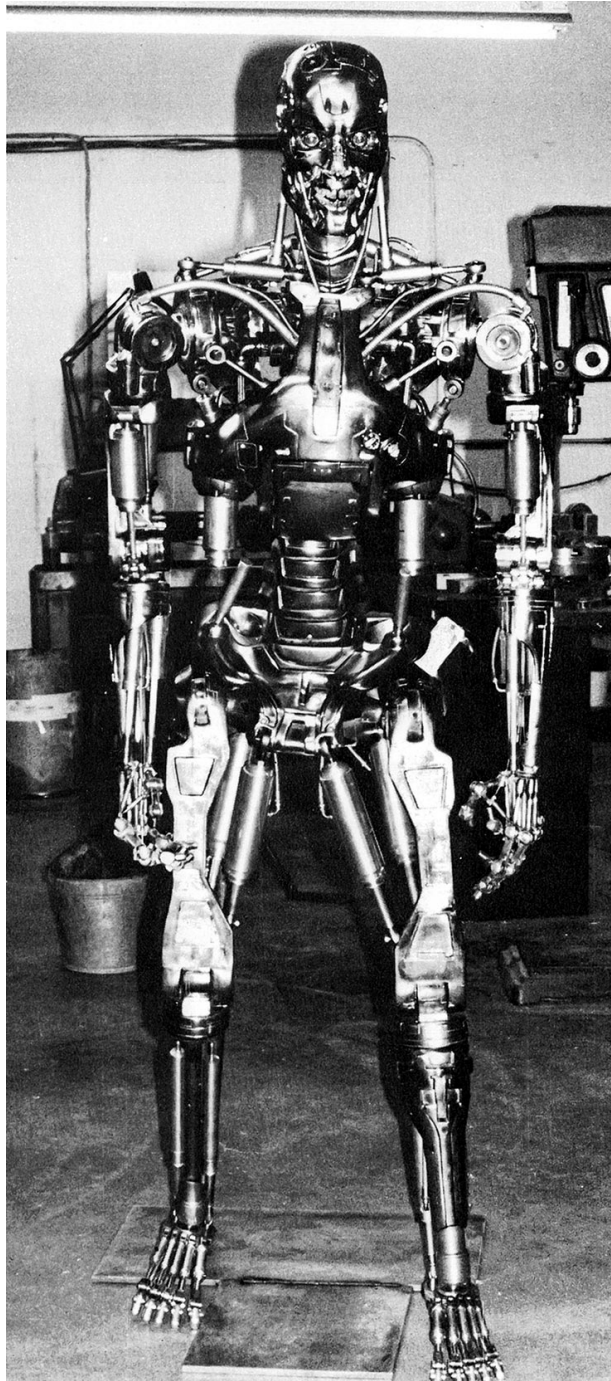
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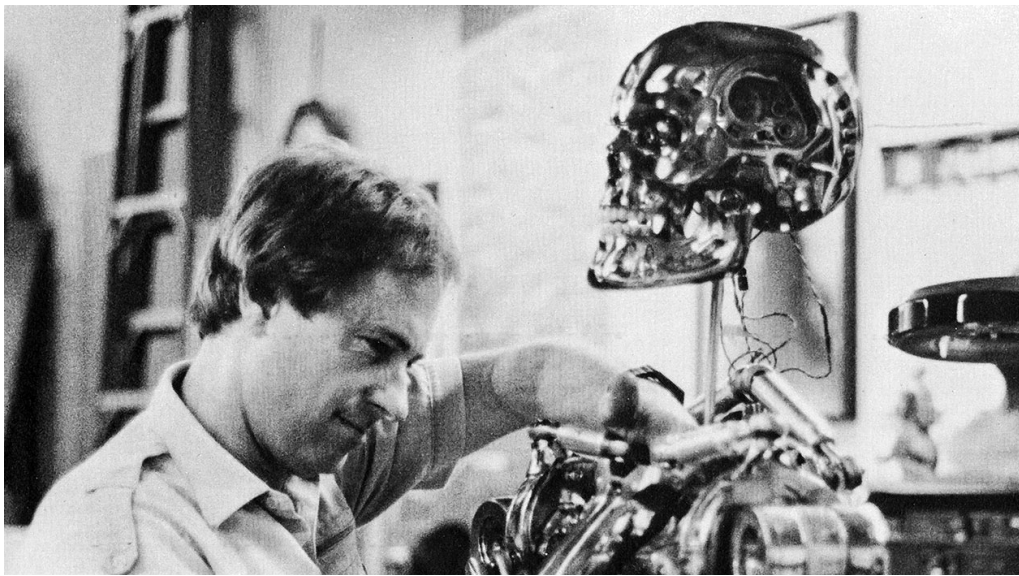
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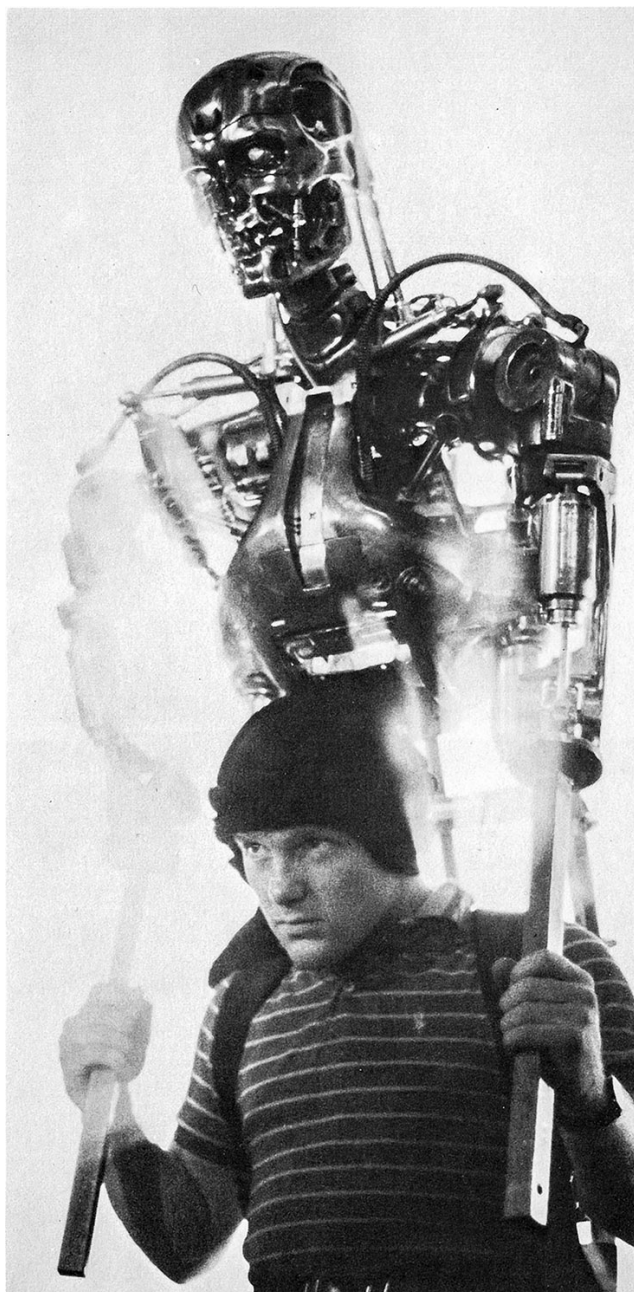
"I wanted to retain Arnold's form in building the robot," said











chrome-plated later on. My theory was, if I did everything pretty much like Stan did, our finish would resemble his. So we used the same epoxy, and the same ratio of aluminum to epoxy as he did. We even went to the same plater he did in order to get the same tones and everything.

"When the pieces came back from the plater—and there were hundreds of them—Ted Rae spent about two full weeks assembling the model, doing the detail work as he went along. Things like hydraulic hoses had to be added and we even attempted to match the nuts and bolts sizes, scaling down what Stan had used to some smaller sizes that were available—and what weren't, we made. So everything worked. Nothing seemed oversized. Mark Sullivan then painted the chrome finish to give it the same scorched look the larger robot had." The final assignment ended up taking five months to complete—two months longer than Beswick had anticipated. "I feel it was worth the extra effort, though. The end result is what everybody remembers, and that robot segment was very important to the movie."

Animating the puppet was no small task. "Working with a puppet that size is unusual," said Peter Kleinow, Fantasy II's resident stop-motion practitioner. "Normally, the average size for such a puppet would be one foot, but Doug had to make it larger because the detail on the full-scale puppet was so great that we couldn't go any smaller and still have working detail. The difficulty in animating a larger puppet is a question of using reference points. When you're animating, you set up a reference gauge over the puppet so that you know you're always moving it in the same direction. If you have to set up a whole bunch of reference points, it makes it much more complicated. On a big puppet, you can't get by with just one reference point—you need two or three gauges."

Kleinow experimented with different techniques to try to inject as much realism as possible into his shots. "Usually, stop-motion is shot with the camera locked off in a stationary position, which tends to subliminally draw the viewer's attention to the fact that it's not real. To counter this, we added little camera moves to the shots, just like a live-action cameraman does. It adds a subliminal sense of reality. In a couple of those shots, a slight pan was used. Since we were filming a combination of puppet, rear projection and foreground elements, we used a nodal point pan so that everything stayed together and didn't shift. Another way we tried to add some realism was by blurring the Terminator's movements. A lot of his movements are very rapid, so we would add blurs, just like a live-action film is blurred. We did that by putting a piece of glass between the camera and the puppet and blurring the image by smearing Vaseline on the glass. We'd have to stop after each frame was exposed, clean the glass, and then blur it again from a different position."

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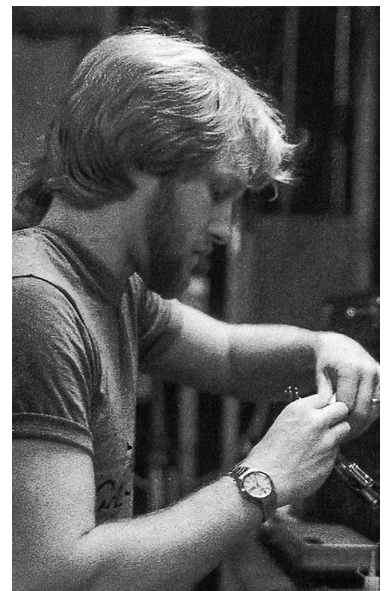
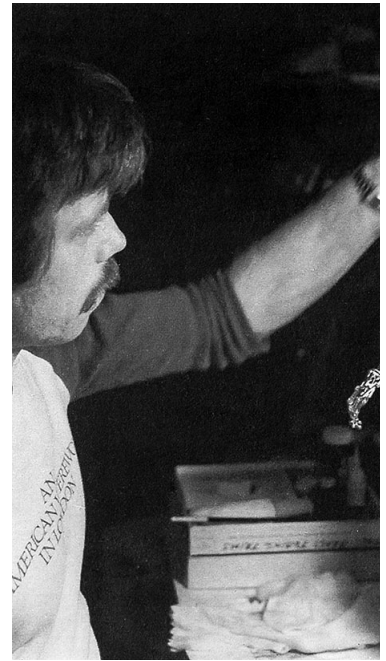
For full-figure walking shots, a two-foot-tall stop-motion robot — matched precisely to its full-scale counterpart — was constructed by Doug Beswick. / Ted Rae prepares the puppet for a stop-motion scene — eventually cut from the film — showing the Terminator, partially destroyed by a pipe bomb, continuing in relentless pursuit of its quarry. / The stop-motion Terminator robot stalks its victims through a hallway in the factory. / Animator Peter Kleinow repositions the large-scale puppet between exposures. Background plate photography is rear-projected, frame per frame. / Another stop-motion setup inside the factory. Whenever possible, camera moves and motion blur were

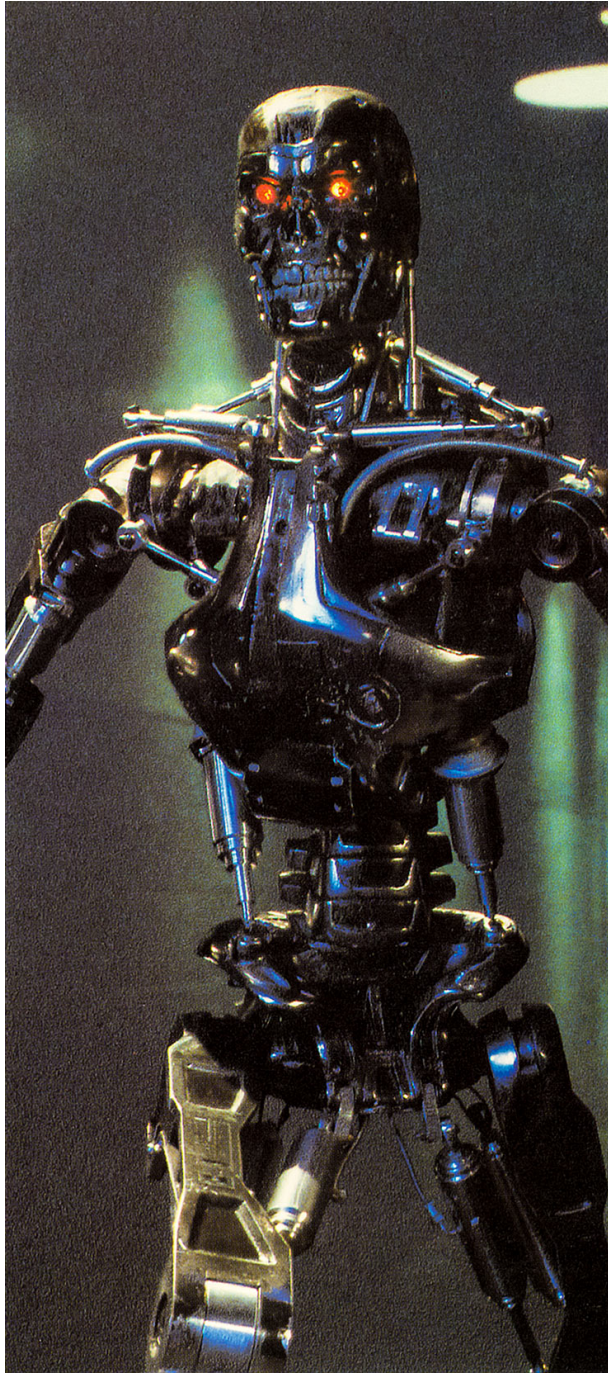
mented, "Pete did anywhere from two to five takes. When you multiply that out by the time it takes to do a single take — which is somewhere between six and sixteen hours — we're talking about a lot of work for one person. We had originally intended to do twelve to fourteen stop-motion shots. There are eight in the film, and I feel we came out even. Pete did a great job with them."

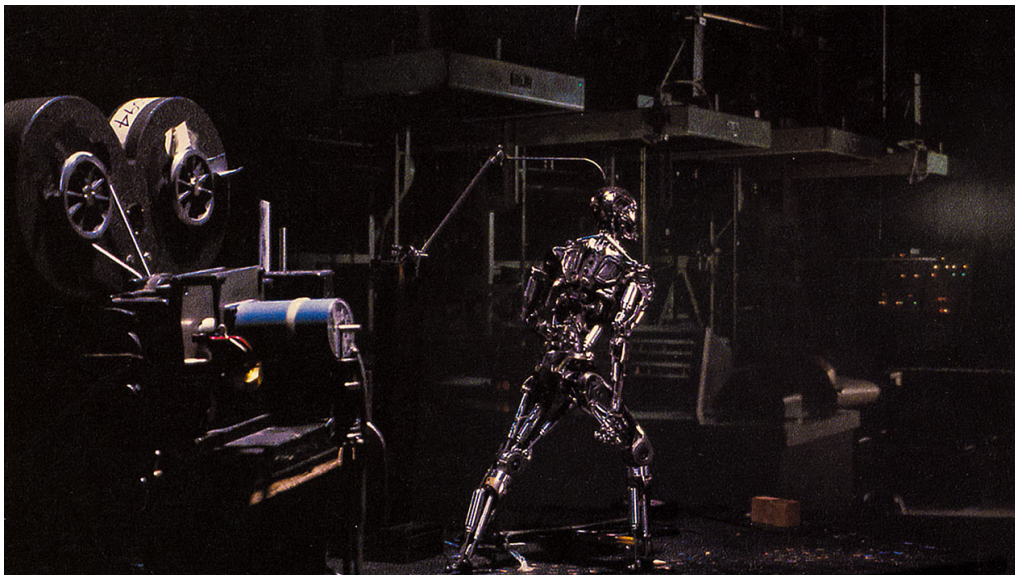
The beginning of the end for the Terminator occurs in the factory as the towering robot looms over his formidable, though all-but-defeated adversary. With a last burst of adrenalized strength, Reese wedges a pipe bomb into the cyborg's rib cage — and before the robot can extract it, it explodes. "For that shot," said Winston, "we constructed a rigid fiberglass replica of our robot, positioned it over Reese, and then just blew it up." Even that, however, does not stop the Terminator. Devoid of its legs and one of its hands, the relentless machine still continues in its pursuit of Sarah, dragging itself across the latticework floor. "Jim and I had discussions during preproduction about designing certain sets in such a way that they would allow us to put rods up through the floor to move our robot. That grating on the factory floor was there specifically to help us with the movement at that point. For those crawling shots, we cocked the puppet's head backward and operated both the head and eyes by radio control." Scrambling away from the ever-advancing robot, Sarah crawls through a giant steel press, lures the robot in after her, and then slithers out and trips the switch just as the robot's hand closes around her throat.

Richard Landon constructed a special robot for the Terminator's final termination. "We cast all the parts in BJB 430 polyurethane," Winston explained, "so that it would collapse rather than snap under the crusher. Since the Terminator is a metal robot, we needed to use a material that would crush like metal would. If we had made it in a fiberglass, it would have broken like glass. So we cast him out of urethane, vacuum metalized him, set him up in his crawling position, and then crushed him."

And thus was James Cameron's cybernetic juggernaut at last dispatched — finally and completely, but perhaps not permanently. Spurred on by the phenomenal success of their maiden venture, Hurd and Cameron are already discussing a sequel. Meanwhile, however, other projects are in development, including Cameron's long-planned follow-up to *Alien* — with a possible reunion of the effects team that brought such an abundance of resourcefulness and dedication to *The Terminator*. "I think the reason people were so excited about working on *The Terminator*," Cameron concluded, "was that they were initially impressed by the script. Often people involved in the type of work done by Stan Winston and Fantasy II find themselves doing a lot of bad 'blood-and-guts' movies just to bring in revenue and survive. So when they get a chance to work on a movie with a good script, they are willing to work that much harder to







THE SHAPE OF DUNE

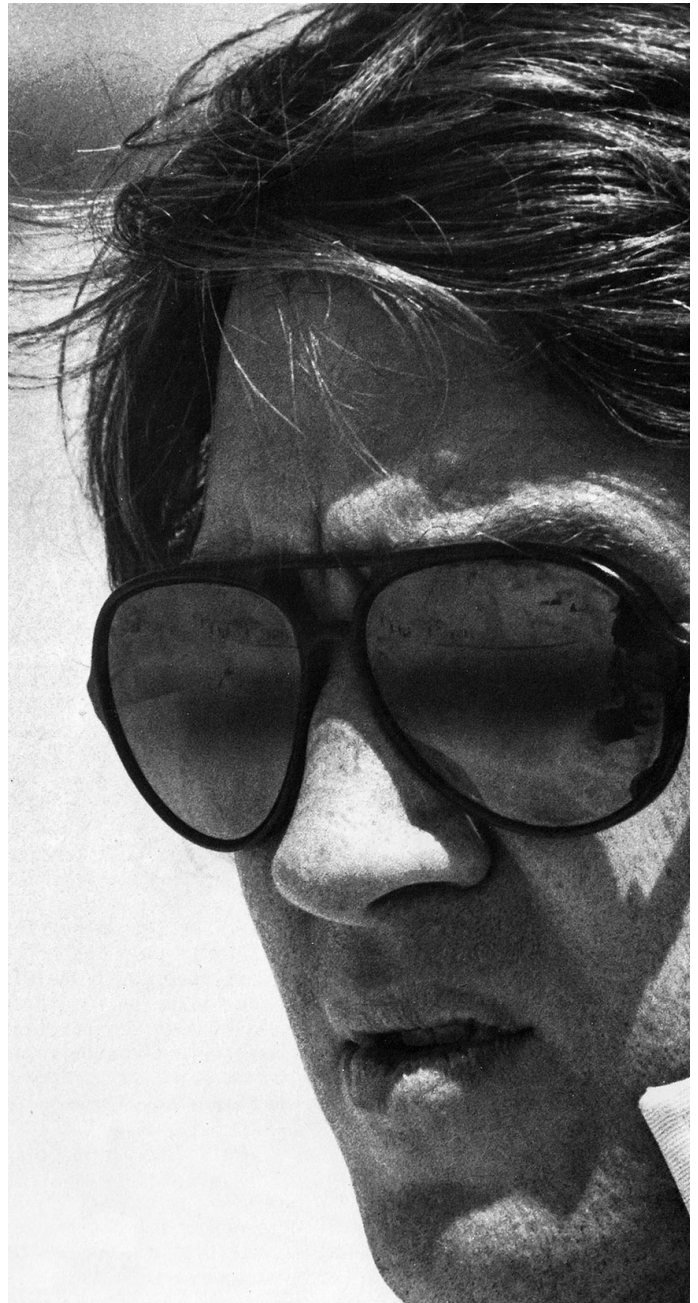


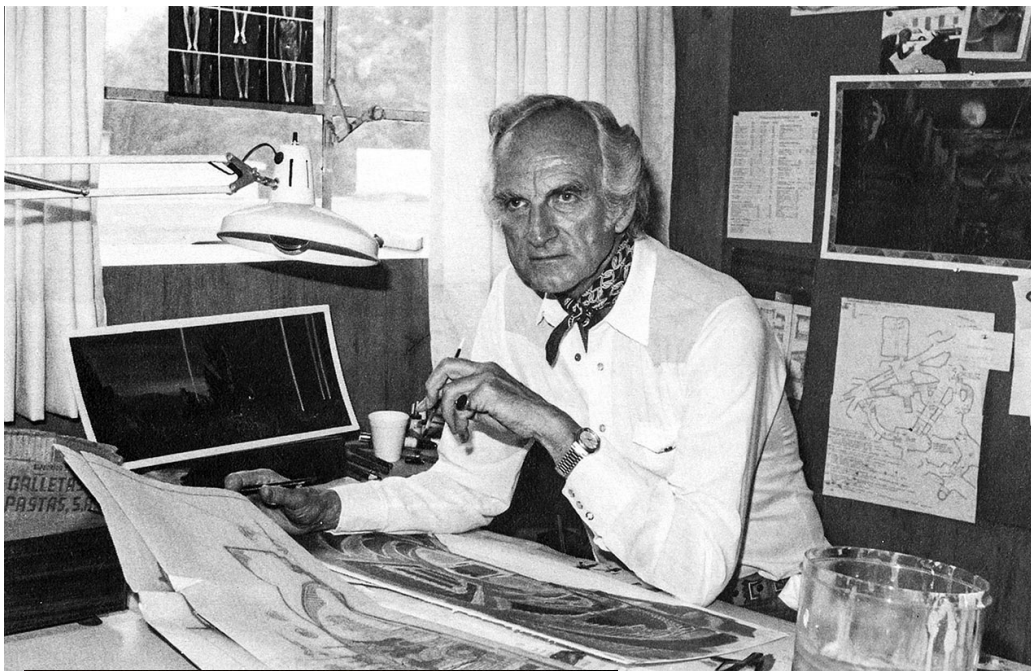
said it was the best work he'd seen so far, and I got the assignment."

Before De Laurentiis gave the go-ahead to Lynch's solo effort on the *Dune* screenplay, the director spent a week picking Herbert's brain at the author's home — a six-and-one-half acre Ecological Demonstration Project situated on Washington's Olympia Peninsula, complete with wind generators, solar power and other instrumentalities designed to demonstrate that a high quality of life can be maintained with a minimal drain on the total energy system. From there, Lynch launched into the script, producing seven full drafts which — unlike previous attempts — strove diligently to maintain the tone and essence of the book. Herbert himself was much pleased with the adaptation, and in the months to come would be a frequent visitor to the *Dune* sets and one of the film's most vocal supporters.

One of Lynch's first priorities was to hire a production designer who would be responsible for molding the shape of *Dune*. To this end, Anthony Masters joined the project shortly after Lynch first set up shop on the Universal lot. With over thirty years in production design, Masters had worked on more than fifty films, including such diverse projects as *Lawrence of Arabia* and *2001: A Space Odyssey*. "For *Dune*, David's first dictum was: 'If it's been done before, throw it out!' And although we were aware of, and had available, some of the design work done for the Jodorowsky and Scott versions of *Dune*, we immediately decided to throw that out too and start totally fresh. Lynch wanted his *Dune* to be more believable than the usual sci-fi projects because — even though the film is set in the year 10,991 — David very specifically *didn't* want the film to have a futuristic look. The people scattered throughout *Dune's* galaxy originated from earth, and if you look a few thousand years back in our own history you'll see that the Greeks were designing buildings very much like some of the banks we use today. So our *Dune*, from the start, was to be grounded in reality, to have the look of a period film even though it's set in the future. We even included some 1950-ish types of over-elaborate, functionless decoration. On the other hand, this film has some incredible elements that could only have sprung from David Lynch's head. We worked *very* closely together on this project, and I was constantly being surprised at what David was coming up with. He was completely approachable at all times — even when you'd find yourself thinking that his ideas were crazy and would never work. Then you'd build those ideas and try them out and find they weren't so crazy after all."

Like Jodorowsky before them, Lynch and Masters immediately realized that their first design consideration lay in giving each of the four planets featured in *Dune* a distinct and recognizable environment. To achieve this, Masters broke down the primary elements into wood, gold, steel and stone. "David and I first began by talking about the look of Caladan. We decided that this Atreides homeworld would be a lot like earth, filled with open







reflect Caladan's biosphere. For the Emperor's planet, Kaitain, we assumed that his enormous wealth would be reflected in buildings made of jade and solid gold. So for the interior of his throne room, we based our designs on that famous Moorish fortress in Spain, the Alhambra. Giedi Prime, the Harkonnen's homeworld, was where David really let go. He's really in love with machinery; and in fact he once said that, given the choice, he'd rather visit an abandoned factory than Disneyland. So Giedi Prime is very over-industrialized, a planet covered with seas of oil and containing buildings that are about as attractive as a fireplug. Everything there is either black metal or green porcelain, with no enrichment or any design idea to please the eye. It's all just practical, lumpy equipment. And on Arrakis — Dune itself — life is very harsh and primitive. The Fremen have built everything out of solid rock, using laser cutters to create the vast, rectangular, clean-cut shapes of their hiding places, the sietches. We also incorporated some very recognizable stylistic architecture in the film. You can see obvious Victorian influences on Giedi Prime, for example, and Mayan motifs as well as Egyptian pyramids on Arrakis. In fact, all of the mosaics and tiling seen in the Arrakeen palace on Arrakis are a direct result of a trip David took to Venice. He visited the cathedral in St. Mark's Square there and was really impressed, coming back to me and saying: 'Hey! Let's get that mosaic look into *Dune*!' So that's where that Byzantine influence on Arrakis comes from."

One of the earliest — and most difficult — design problems facing Masters revolved around the ornithopters, Herbert's airborne vehicles that traverse the skies of Arrakis using supple winglike appendages. "But we quickly decided that there was no possible way we could design a craft with flapping wings that wouldn't be laughed off the screen. That decision was the easy part; actually doing the design was quite a chore." After lengthy discussions with Lynch, Masters began sketching, submitting, analyzing and resubmitting various approaches — going over more than 150 ornithopter designs before the film's two basic crafts were decided upon. The Atreides 'thopter evolved into a diamond-shaped vehicle capable of unfolding into a boxlike structure for flight, then reverting to its original shape upon landing to protect it from the harsh sandstorms found on Dune. The Harkonnen ornithopters are made of three interconnecting steel tubes, giving the craft a dark, heavy, sinister look. But what of the nonexistent wings? "David came up with a concept he called 'ether benders' — large magnetic pads fixed on the bottom of the 'thopters which used anti-gravitational fields to push them away from the surface of Arrakis. This concept made

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Although a production designer usually contributes to a film's storyboards — "Originally David didn't want to use storyboards at all," offered Raffaella De Laurentiis, "I really had to push him on that" — Masters soon realized that the enormous workload generated by *Dune* would obstruct his personal involvement in this area. Therefore, production illustrators Mentor Huebner and George Jenson were hired to storyboard *Dune*'s special effects. Apogee board artist Marty Kline also contributed to the film during his company's involvement with *Dune*.

Carlo Rambaldi and crew first sculpted the third-stage Guild navigator in plasticine. The imposing figure was then cast in foam rubber and assembled over an aluminum and steel armature. Cable-actuated control mechanisms provided facial and body movements. / Rambaldi (rear) and makeup artist Luigi Rocchetti apply a few last-minute brush strokes on the set. / Padishah Emperor Shaddam IV (Jose Ferrer) confronts the visiting third-stage navigator and his retinue of first- and second-stage navigators. Floating in a cloud of orange spice gas — actually orange smoke — the third-stage navigator represents the pinnacle of melange-induced mutation. / A second-stage navigator makeup, created by Christopher Tucker, was ultimately rejected because of insufficient time and funds. / On stage, camera operator Ken Worringham, David Lynch and effects supervisor Barry Nolan use a

But perhaps the most influential of Masters' artistic aides was production illustrator Ron Miller. An artist and writer whose work has appeared in dozens of magazines and books, Miller is a past director of the Smithsonian Institution's exhibits of futuristic and astronomical art. In fact, it was one of Miller's own collections of astronomical art — an excursion through the solar system titled *The Grand Tour* — that landed Miller his job on *Dune* in the first place. "Apparently David thought my paintings of Mars looked just like Dune; and the next thing I knew, I was being flown out from my studio in Virginia to the *Dune* production offices in Los Angeles."

Miller began his year-long stint on *Dune* by producing fifteen large-format conceptual paintings, along with a couple dozen smaller illustrations, based on some line and magic marker drawings provided by Tony Masters — the sum total of *Dune*'s preproduction art at that point. "But I quickly moved into other areas, too. Although no one really asked me, I soon found myself evolving into *Dune*'s unofficial science advisor, trying to keep things as empirically reasonable as possible. At one point, I even brought in my own astronomical consultant, William Hartman, to talk to David about the more scientific aspects of the production. Of course, the novel was the ultimate reference for questions about anything. *Everybody* had copies of it — and if you didn't, they gave you one. Frank Herbert even provided the filmmakers with a pronunciation list of his rather strange vocabulary." Not long after Miller began working on the film, his wife — artist Judith Weiss — also became involved, producing a number of folded paper models of sets and machines which served to help Lynch visualize the look of the art department drawings.

"As I worked on *Dune*," Miller continued, "I found out that Lynch's three favorite things in the world were small triangles, black rubber and little twisty wires. I also found that David hated over-detailed models — the kind that look as if they've



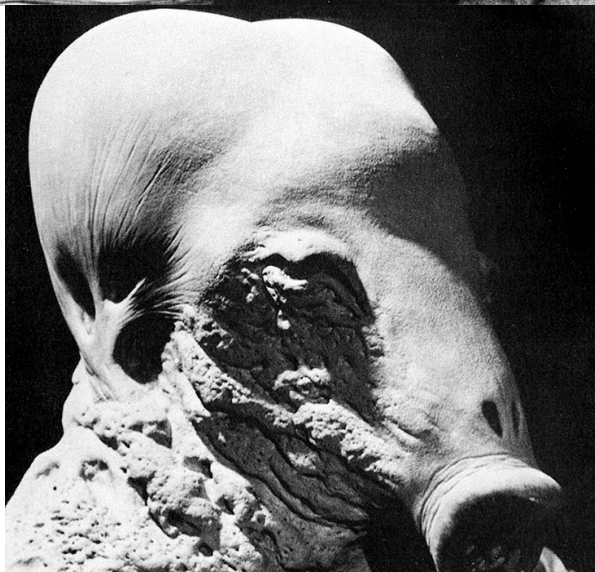
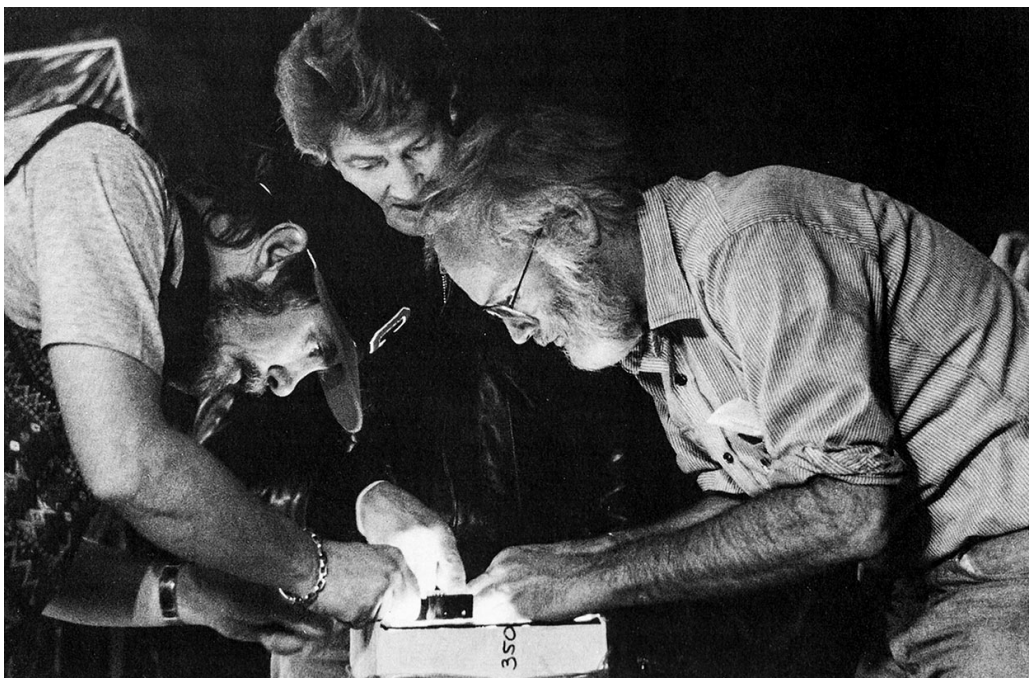
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Carlo Rambaldi and crew first sculpted the third-stage Guild navigator in plasticine. The imposing figure was then cast in foam rubber and assembled over an aluminum and steel armature. Cable-actuated control mechanisms provided facial and body movements. / Rambaldi (rear) and makeup artist Luigi Rocchetti apply a few

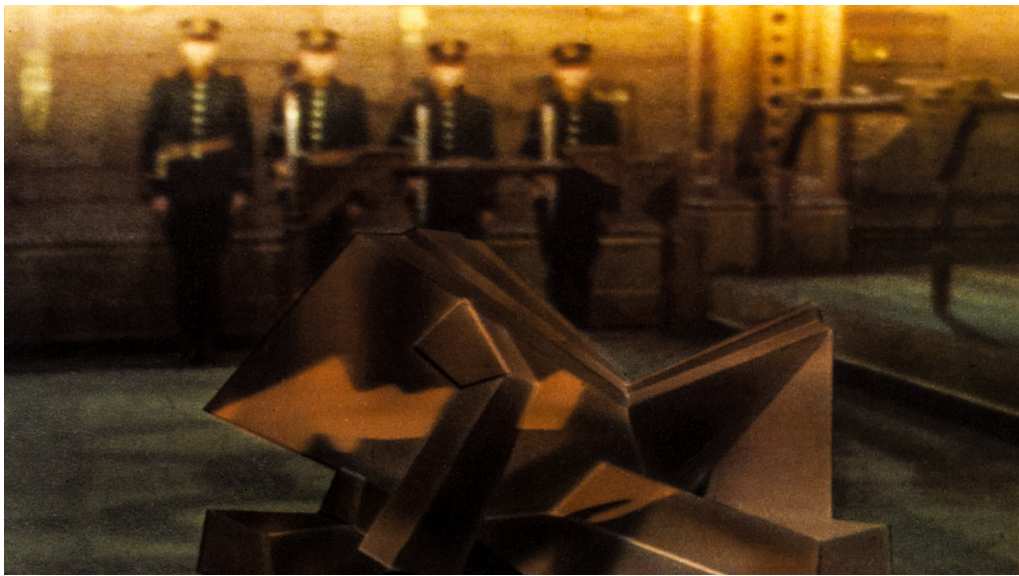
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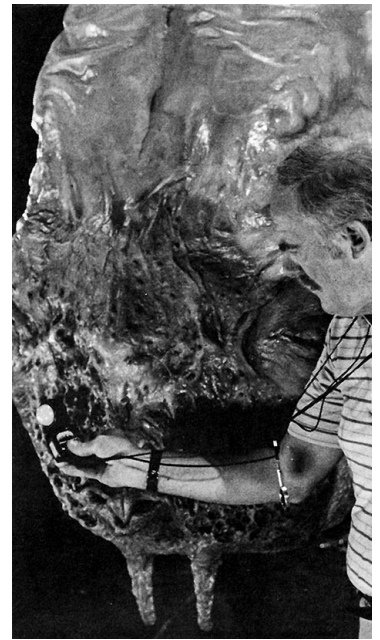


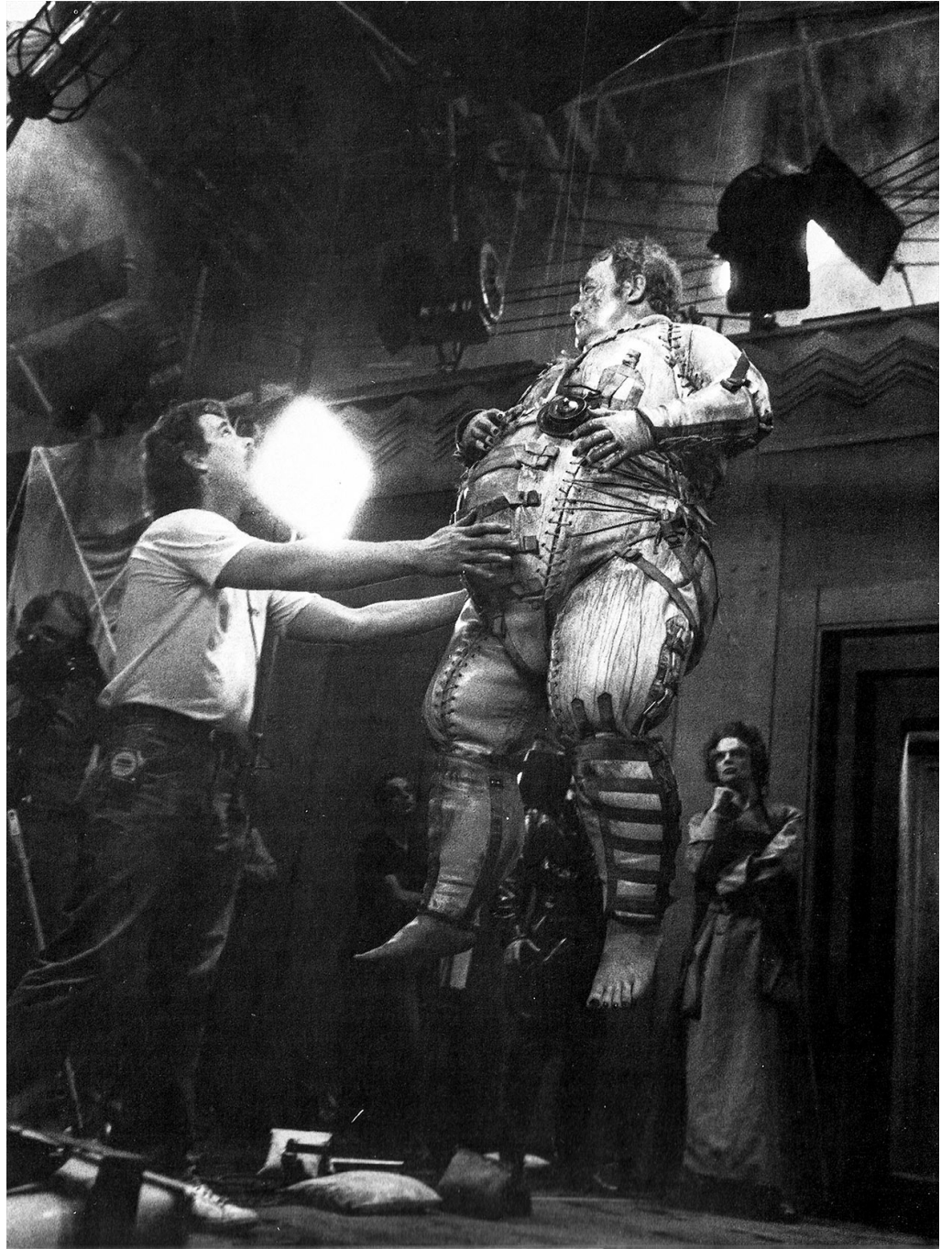
Effects cinematographer James Devis checks the lighting for a closeup insert of the third-stage navigator. / Baron Vladimir Harkonnen (Kenneth McMillan) relaxes as his facial boils are lanced — a convincing Giannetto De Rossi makeup involving numerous latex appliances. / McMillan — whose grossly obese character requires anti-grav suspensor units for support — models his fat suit for director Lynch. Conceived by costume designer Bob Ringwood, the canvas and rubber suit was filled with silicone gel to impart an authentic sense of fleshiness. / Although the majority of the flying scenes were rigged and photographed on the Giedi Prime sets, the finale — in which the Baron's anti-grav system goes haywire, ejecting him through a hole in the palace wall and into the gaping maw of a sandworm — required an elaborate tumbling mechanism and was photographed against a blue screen. / Flying unit supervisor John Stirber lends a steadying hand as

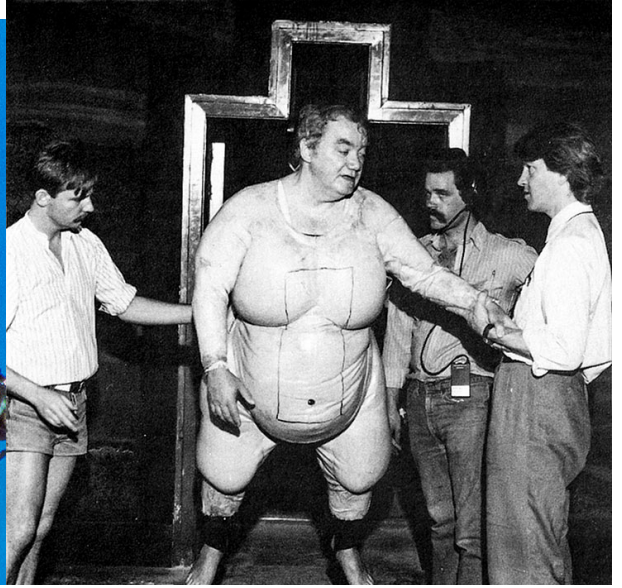
was to produce the robot fighter Paul Atreides (Kyle MacLachlan) encounters during his training. Lowered from the ceiling of the training room set, the fighter robot was conceived as a deadly, brass-sheathed mechanism equipped with hydraulic rams and spears sufficient to test the mettle of any warrior. "It seemed to us," said Tony Masters, "that Kyle had to fight this thing in a controlled area, since the robot itself was going to be very limited in its movements. The robot fighter basically evolved out of a simple cylinder covered with a series of disks, each of which concealed a weapon that would do something. In this particular instance, though, form followed function. We didn't know what weapons we could make and what actions they could do. So we got Kit West involved in that, and had him just invent things he felt the robot could do best. Then, after Kit told us what he could do, we designed those things into the robot."

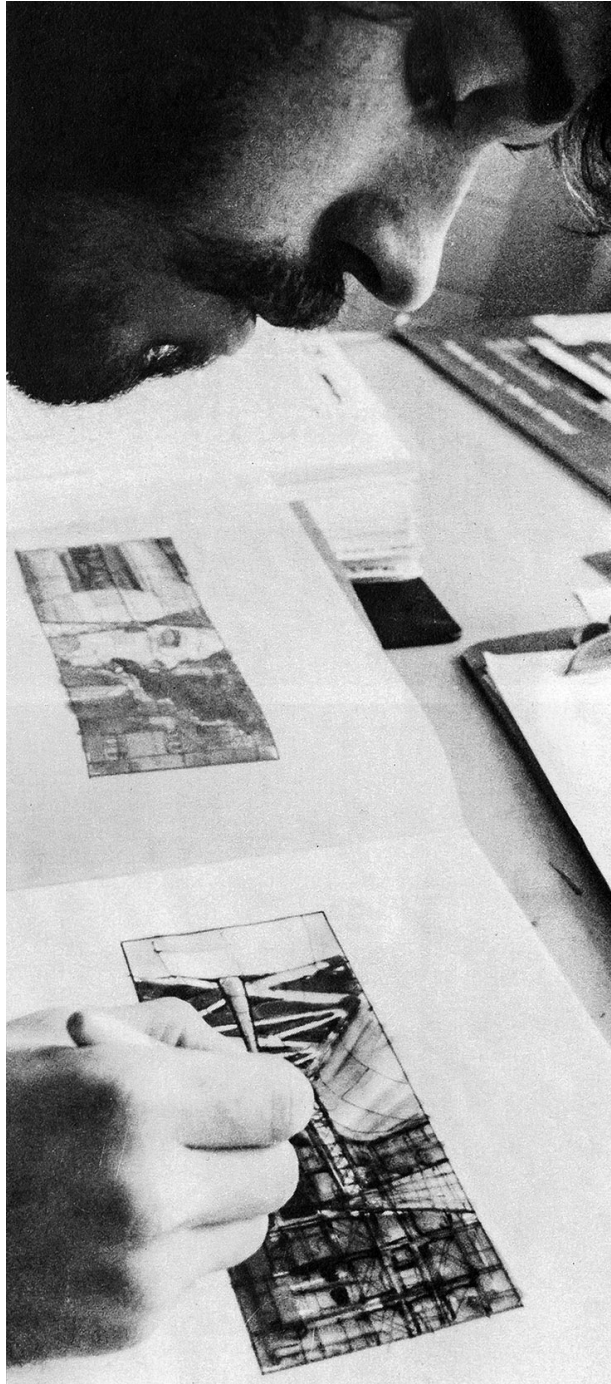
Once the design was approved, West and his crew manufactured the fighting machine in their Churubusco workshop. "The actual cylinder itself, and much of the detailing, was made out of fiberglass," West explained. "Then we realized that there were going to be about six layers on that robot that actually did something, so we sat down again and figured out which layer would do what and how it would be controlled. The systems we came up with eventually involved pneumatics, radio control, cabling, plus compressed air lines and vacuums since the objects on that robot had to fly out and retract. We also ran a gas line into the tip that Paul melts with his weirding module; this was simply wax that melted after the gas was set off by a small igniter near the end of the line. Incidentally, my crew and I decided that since the camera would be very close to the action, we couldn't get away with putting rubber tips on the spears and things. So all those dangerous knives and spears there had real brass finishes on them.

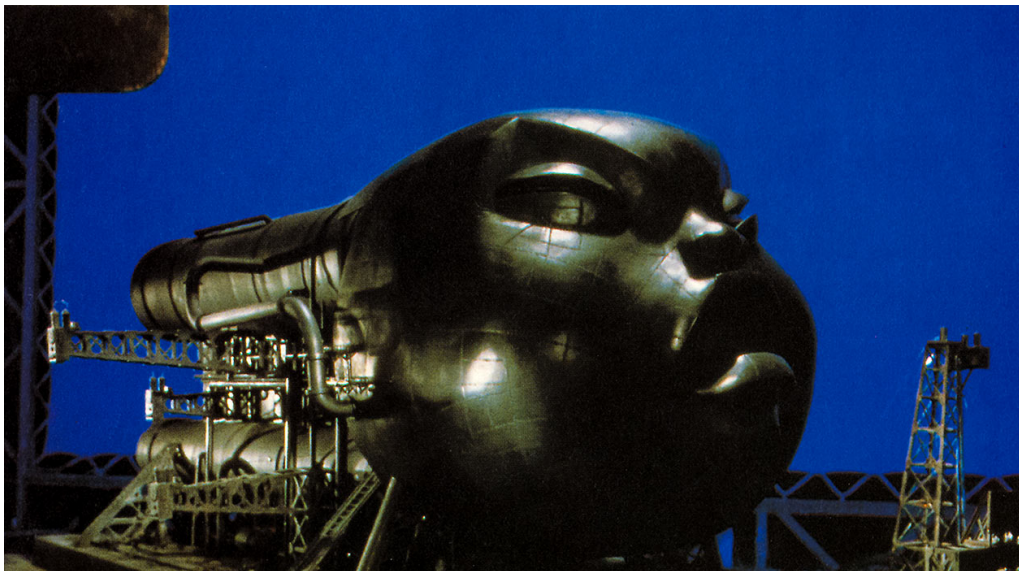
"But physically controlling that robot was probably the trickiest thing we had to do. I designed it so that it would not only advance or retreat on an opponent, but revolve on its own axis as well. In the ceiling above the robot was a large steel turntable about five feet in diameter, on which was a pivoting horizontal elbow made of metal that broke in the middle. The robot hung off one of the ends of this elbow on a straight shaft equipped with pulley blocks. In other words, the turntable rotated in a circle while the elbow straightened out or contracted as the robot revolved around this shaft. The whole apparatus was controlled on levers activated by pneumatic rams. It took six people to operate the robot when it was down and fighting, plus another six on the mechanism which raised and lowered and revolved the whole thing. For some of the close shots of the fighter throwing out its spears, we took an appropriate sectionalized piece of the robot, hung it on a lamp stand and operated it that way. Also on the robot, we had a little lens at the top of the cylinder that was always supposed to be facing the actor, since this was how the fighter tracked its opponent. That lens was

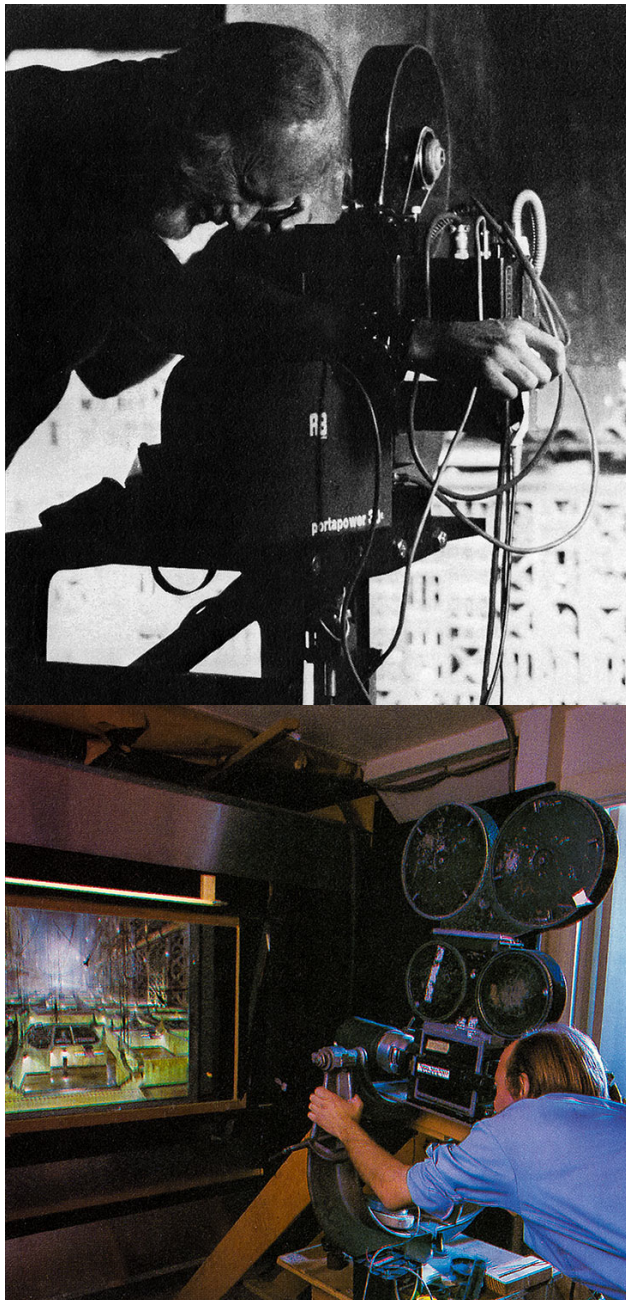












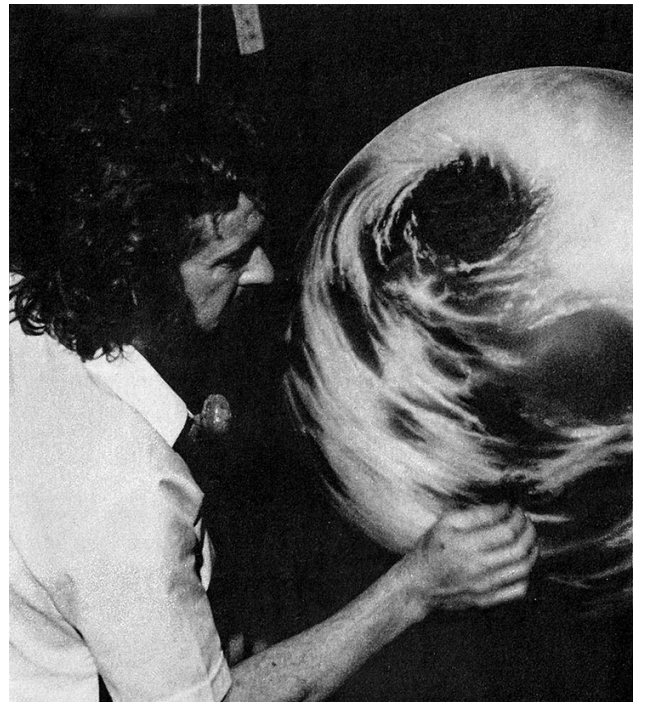
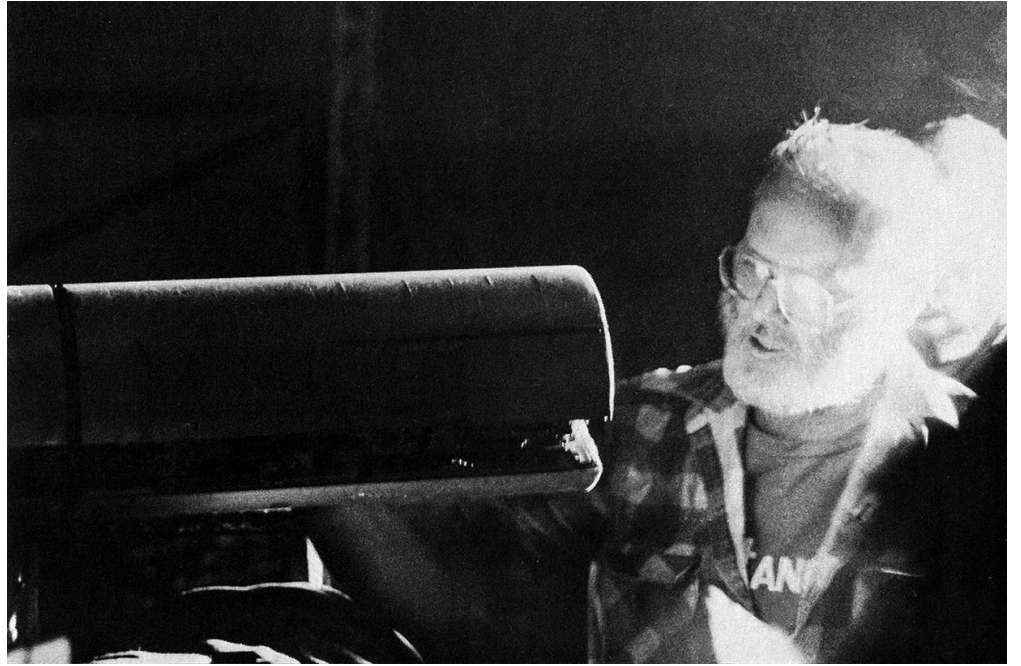
for shots where various parts of it had to be blown off — both in Paul's fight, and then later in the Fremen training sequence.

Extensive wire work was also featured in *Dune*, ranging from the relative simplicity of gently floating glow globes to the kinetic attack of a small, but deadly 'hunter-seeker' unit. "The 'hunter-seeker' is supposed to be an anti-grav assassination device attracted to the slightest motion," West explained. "If it hits you, the tip comes off and races through your body, tearing everything away in its path until it comes to the nearest large organ — not a nice way to go. That prop was basically turned out of brass, with a nose cone spun in plexiglass that we did on a lathe. An actual hypodermic needle was on the end of it. There's one shot from the hunter-seeker's point of view as it's stalking Paul. That we did by sticking an eighteen-inch diameter vacuum-formed plexiglass half-globe in front of the camera, with a lot of little mechanisms inside that moved and swung around to suggest sensor devices and a gyro." Most of the shots, though, were simply marionetted, with the prop hanging on thin wires. "Eventually, someone opens the door and Paul — who's been standing stock-still — has to grab this thing as it flashes past him. We shot the prop down a wire by compressed air; and when Paul grabbed it, we just cut the wire so that he could turn around and smash it against the wall. Kyle timed it just perfectly." To complete the effect, small squibs were simultaneously set off in both the prop and in the wall section where MacLachlan crushed the device.

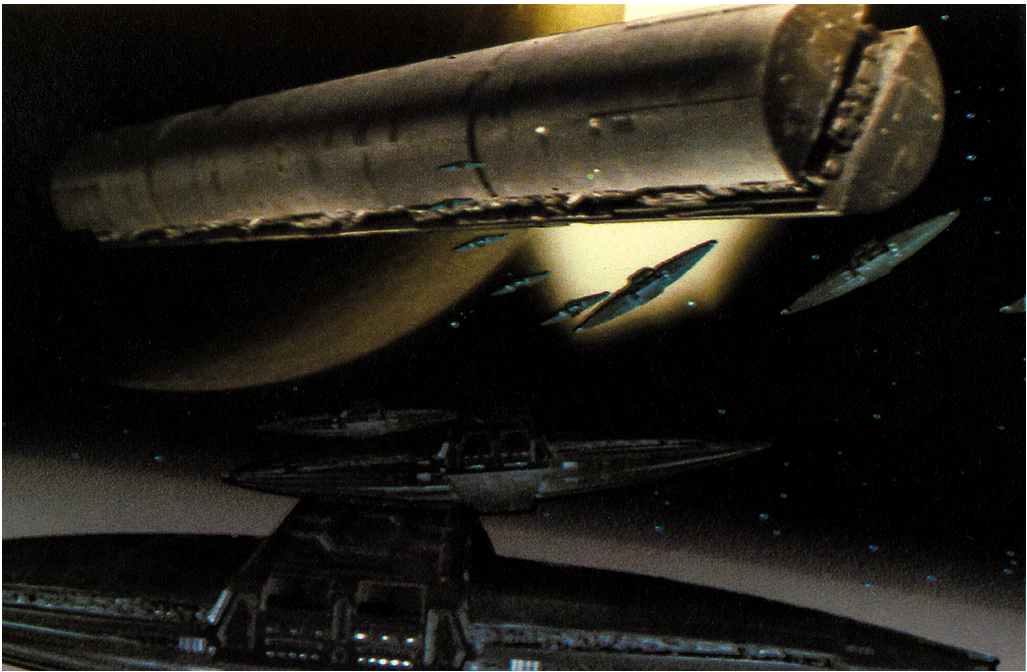
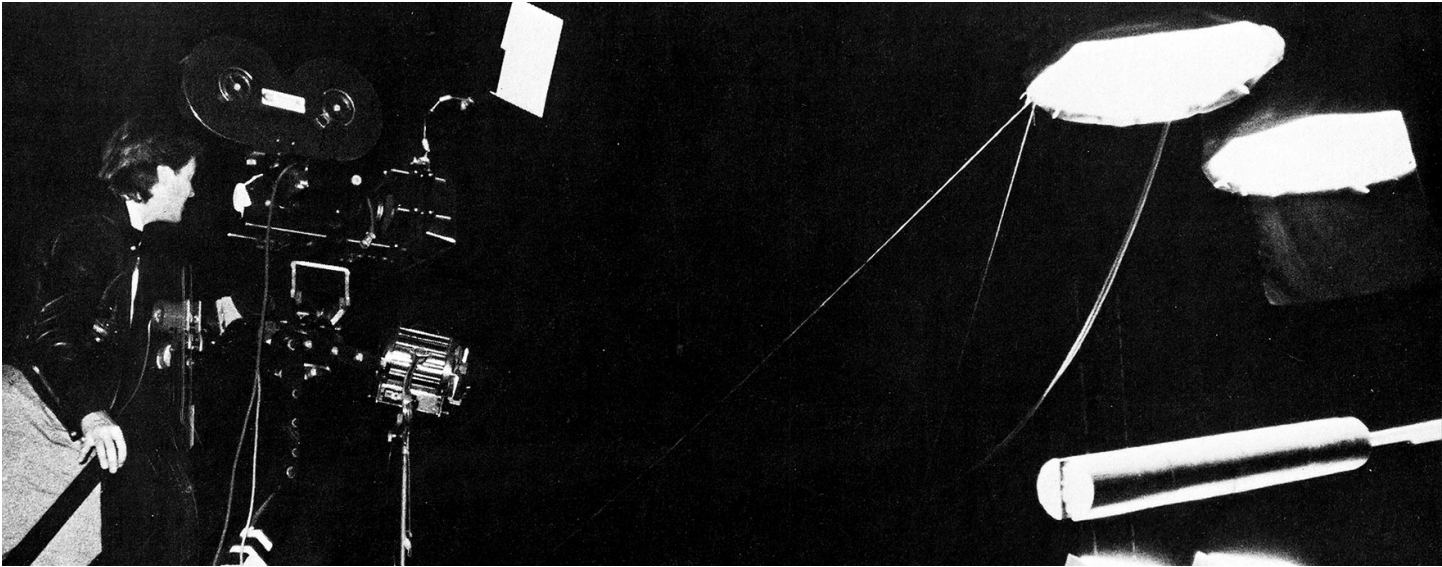
The most impressive showcase for the wire crew's talents was with the villainous Baron Vladimir Harkonnen (Kenneth McMillan) who — as in Herbert's book — is so grossly corpulent that he cannot walk. Instead, his weight is carried by anti-grav suspensor mechanisms. The Baron's costume proved to be quite a challenge for British costume designer Bob Ringwood, whose previous credits include the wardrobe creation for John Boorman's *Excalibur*. "Vladimir is supposed to weigh about four hundred pounds," said Ringwood, "and Ken McMillan, although he is a short and round man, only weighs about two hundred. So I designed and fabricated a hundred-pound fat suit for him in Los Angeles that was made primarily out of thin canvas and a strong rubber—I used colostomy bags, actually, which are already flesh-colored. Then I divided the suit up into pockets, which were filled with a silicone gel that gave a nice fleshy movement to the suit. I also used colostomy bag rubber for the bits of flesh that bulged out from between the folds in the Baron's suit."

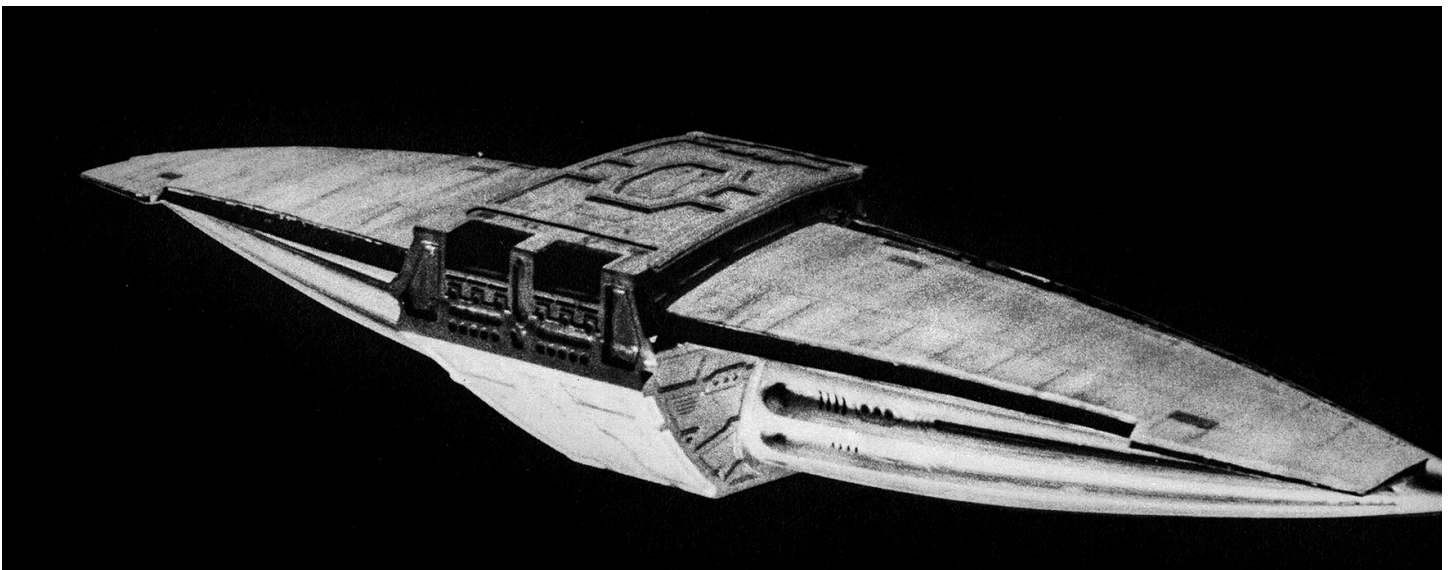
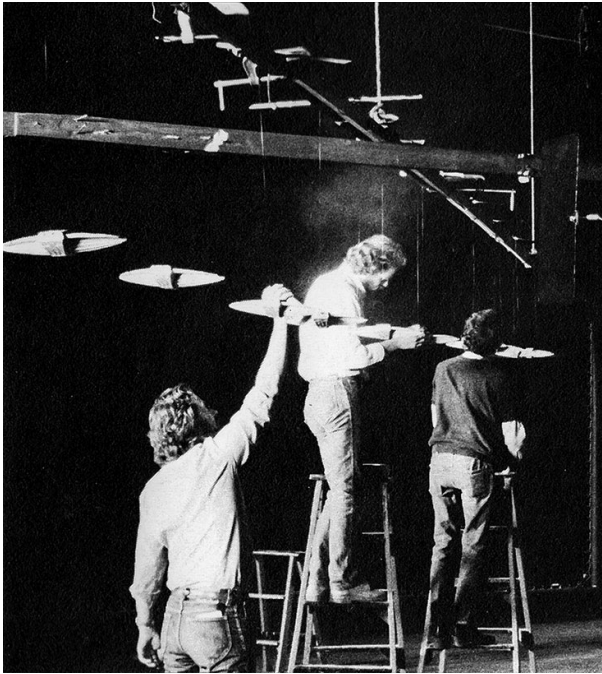
Ringwood ultimately fabricated two fat suits — one of which was laced with tiny tubes through which cold water could be pumped to cool off the actor. Both were equipped with a cup and catheter system developed by NASA that allowed for safe urination while in costume. By the time McMillan had spent about an hour-and-a-half suiting up, the actor had acquired almost

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David likes weird biology. He even hired a very tall Mexican with acromegaly to play a soldier."

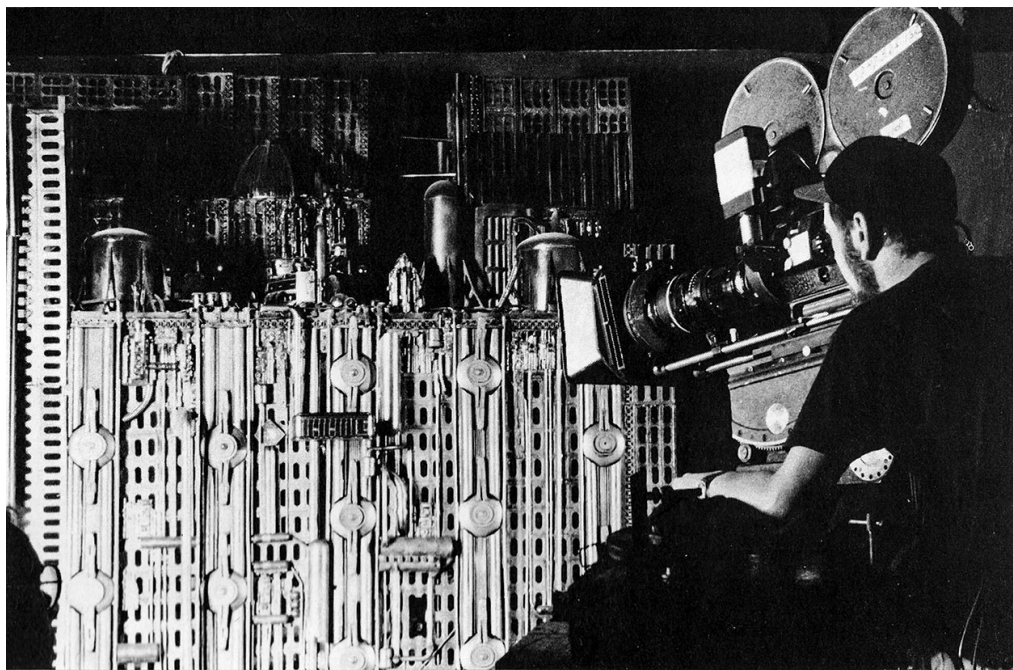
Second-stage navigators — humans more advanced along the spice mutational trail — were represented by actors wearing strange leather hoods, ostensibly to conceal their features, but in actuality because their makeups were never completed. "The second-stage makeup was very elaborate," said De Rossi, "and was done by Christopher Tucker, who had done John Hurt's makeup for *The Elephant Man*. The mouth was like a long, narrow trumpet, which made the man's face look like a white elephant with skin problems. But since the second-stagers were only intended to be featured in a couple of short scenes anyway, it was finally decided that there was no time or money to include them in the film. So these makeups were dropped."

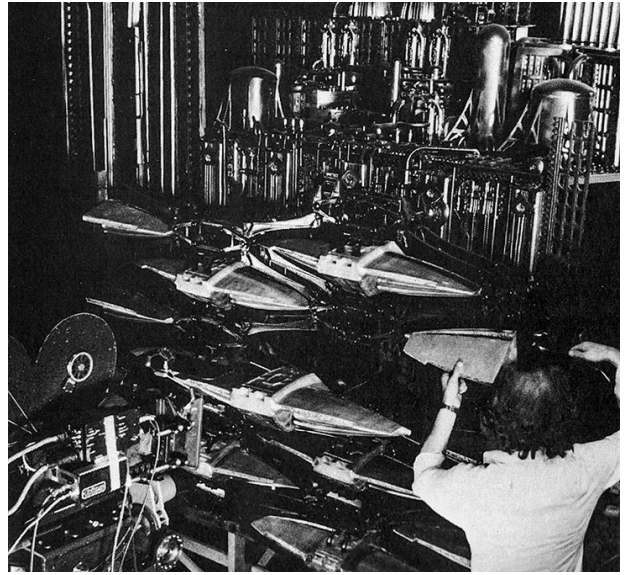
Creation of the third-stage navigator — described in the script as a 'fleshy grasshopper' — was clearly *not* a job for the makeup department, however, and plans for its development began with Tony Masters. "Actually, the design of the third-stager started one day while David and I were in a restaurant and David began doodling these designs on paper napkins — just an outline, really, in the Picasso style, with a couple of dots for eyes. David is forever doodling on paper napkins. So I took one of his rather strange drawings, combined it with some ideas I knew he had in his head, and drew my own version of the third-stage navigator, which David accepted completely. Then Carlo Rambaldi took my drawing and gave it his own input, making the navigator a bit more slug-like."

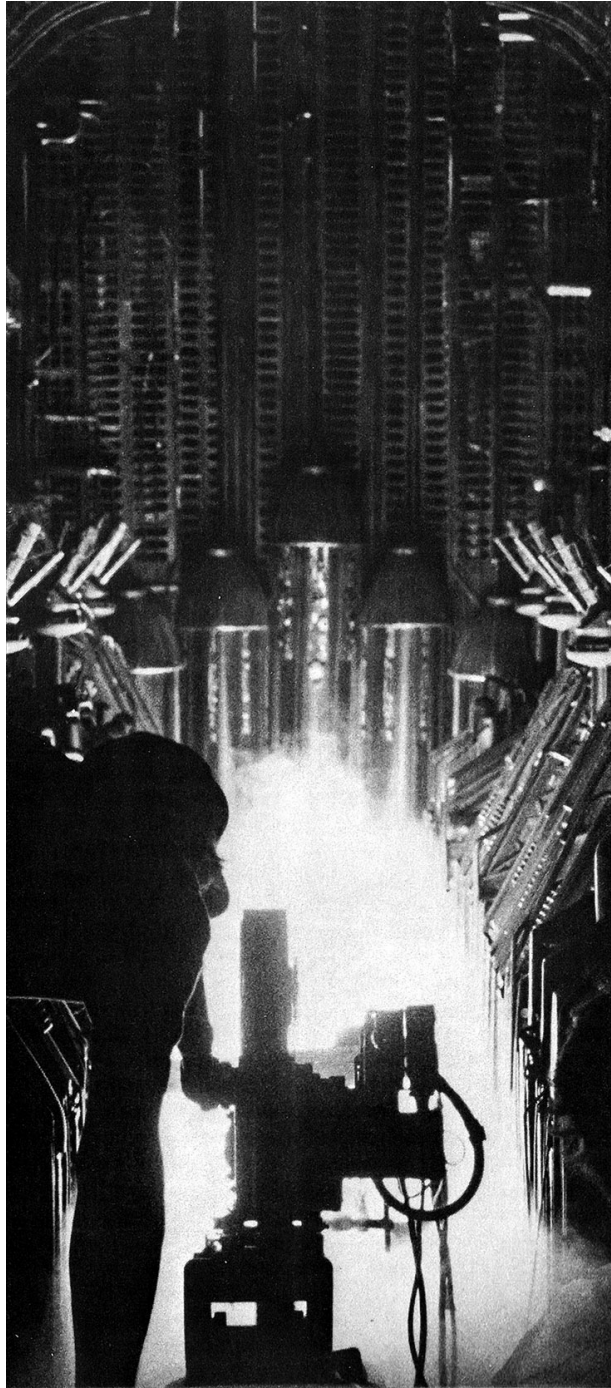
Carlo Rambaldi, a long-time De Laurentiis collaborator — and a multiple Oscar-winner for *King Kong*, *Alien* and *E.T.* — joined the *Dune* company in mid-1982. The task of transforming the navigator design into a three-dimensional figure began in the master creature creator's Northridge studio, with Laurie Marems, a sculptor and general assistant to Rambaldi for the past six years, and an expert crew of carvers — Willy Whitten, Tom Connors, Edmund Shumpert and Pat Newman. "We were all working on Alia and the worms and the navigator simultaneously," recalled Marems, "but the large third-stager was literally the biggest project. He had to be put up on top of a big, heavy metal structure in Carlo's shop because he was sculpted out of \$13,000 worth of plasticine that weighed about two-and-a-half tons. Internally, that sculpture also had a steel support system to hold it all together. We even had chains hanging from the ceiling and attached to the top of the sculpture to support the supports!" When finished, the navigator was more than sixteen feet long, with a head height of six feet.

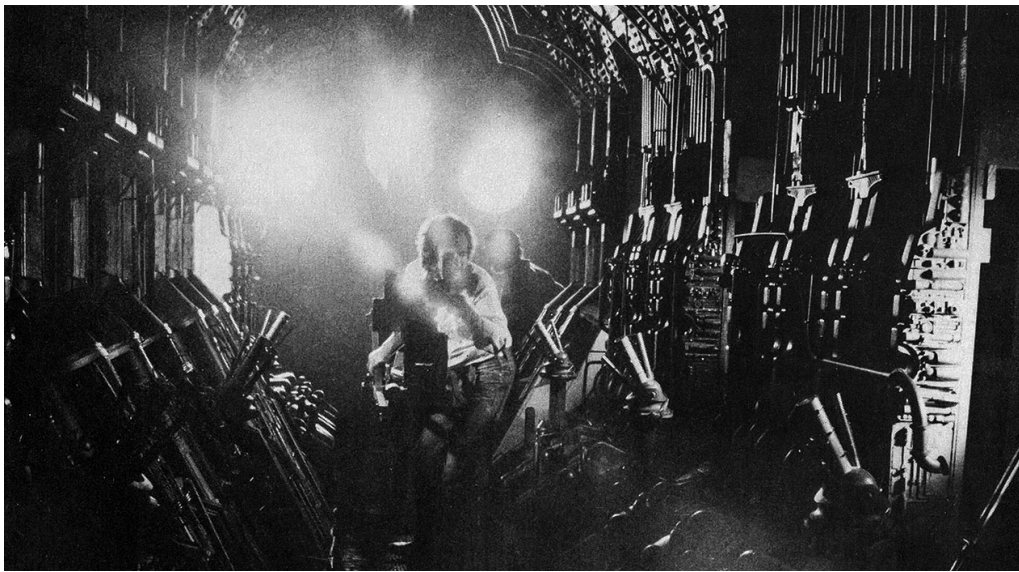
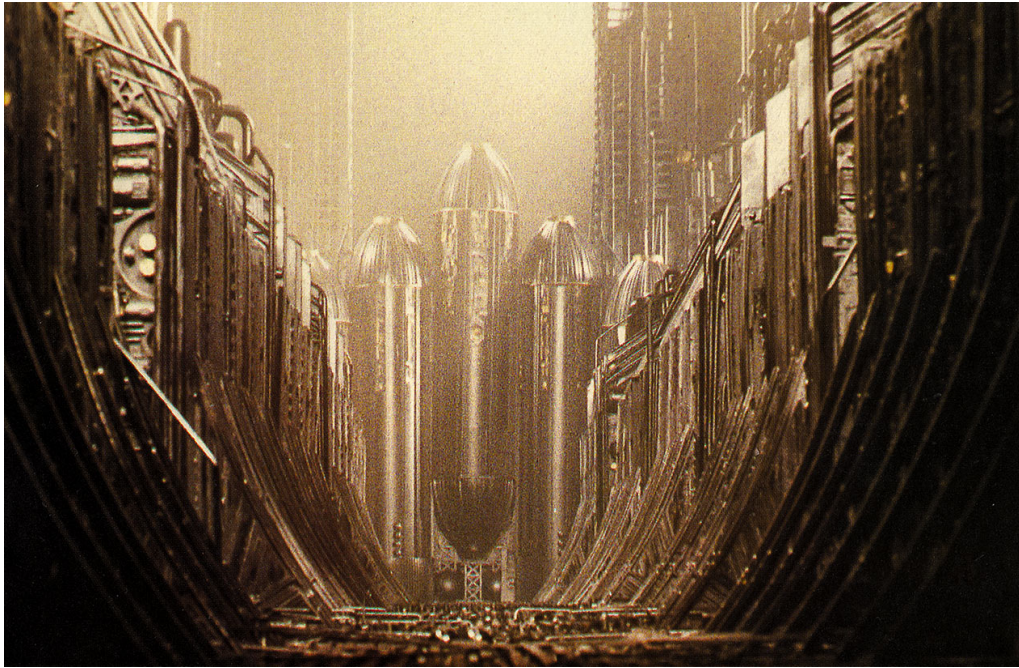
Working under Rambaldi's direction, Ralph Cobos and a small crew then applied plaster to the sculpture in different areas, producing a total of thirty sectional molds — molds from which latex pieces would later be pulled and reassembled to

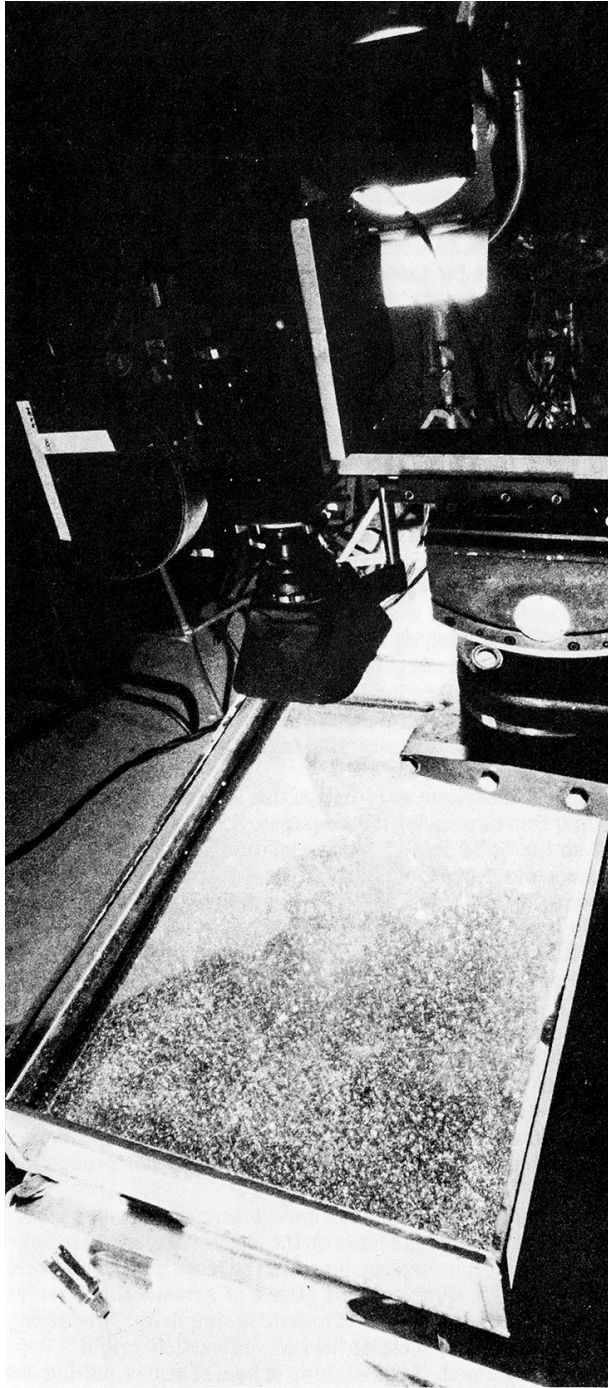
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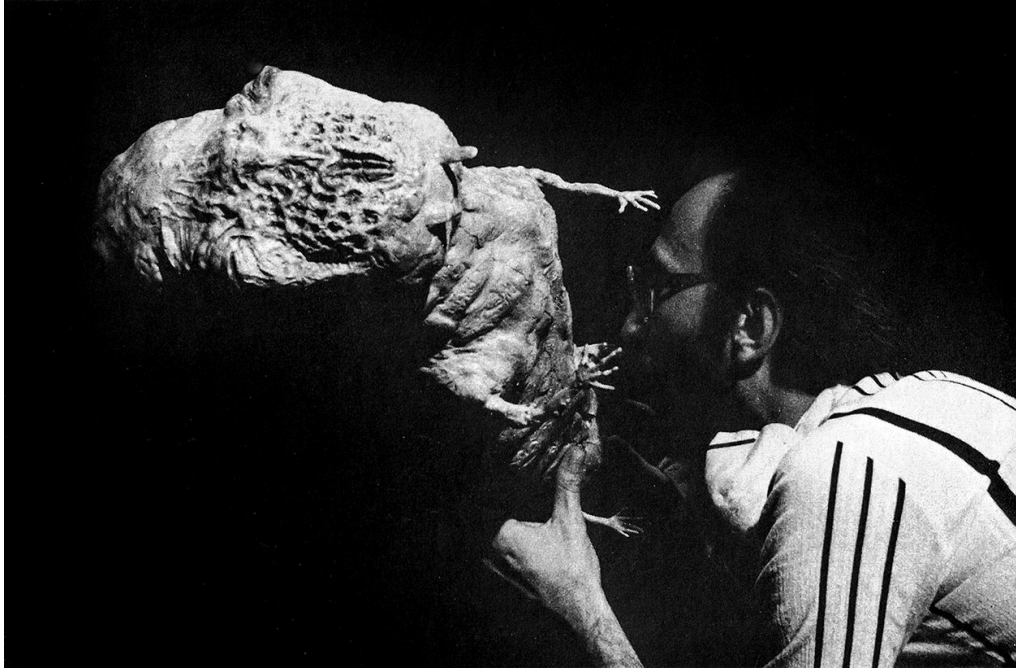


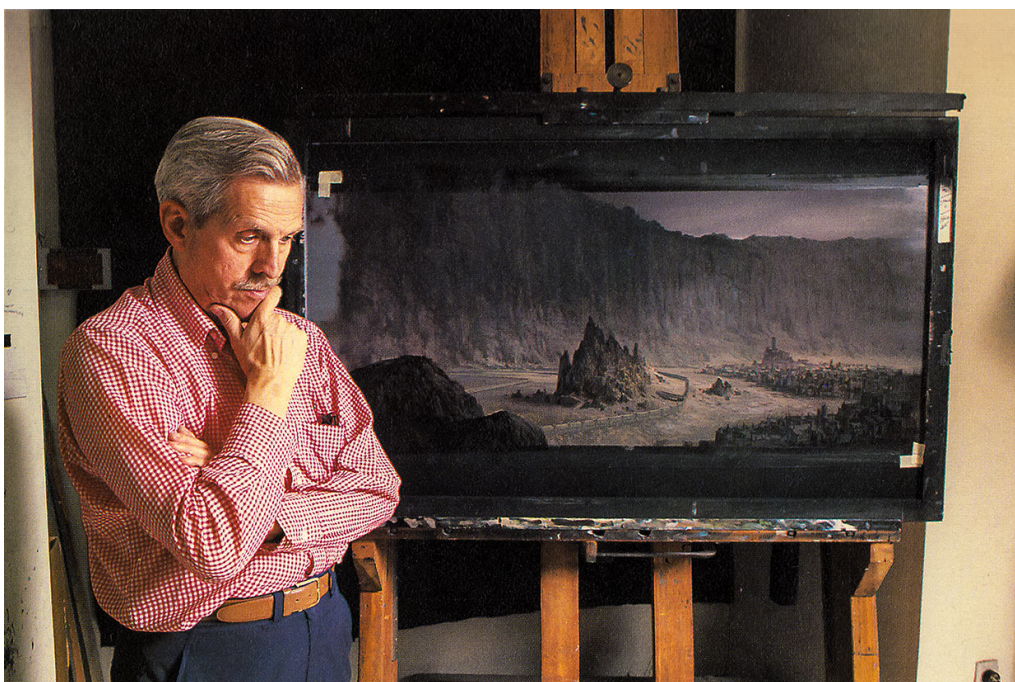












was then illuminated to suggest a purp with the descending miniature Guild second.

The final shot in the arrival sequence tors actually exiting the Guild ship — and expertise of *Dune's* foreground mi Ruiz del Rio. Ruiz, one of the leading wor has provided miniatures for Italian, Spar ican films since 1941, with credits on *Doctor Zhivago*, *Solomon and Sheba* an dra, as well as De Laurentiis' own *Cor Conan the Destroyer*. "Ruiz' hanging m the answer to a certain realism proble Lynch. "When you do a clever in-the-car like the kind Emilio is so good at, then shot. Besides, some of these old-timey just as viable today, even though a lot forgotten them."

"David and Raffaella were both con sense of bigness to the movie, to make it I and my people built a dozen models f hanging miniatures and the more noi which took us nearly a year to build. The construction of the models were prima fiberglass. The hanging models were ve the spaceships, because they were wired little ducts and hoses that let us blow sm them. And though we did shoot some speeds, almost all of the hanging miniati at 24 frames per second."

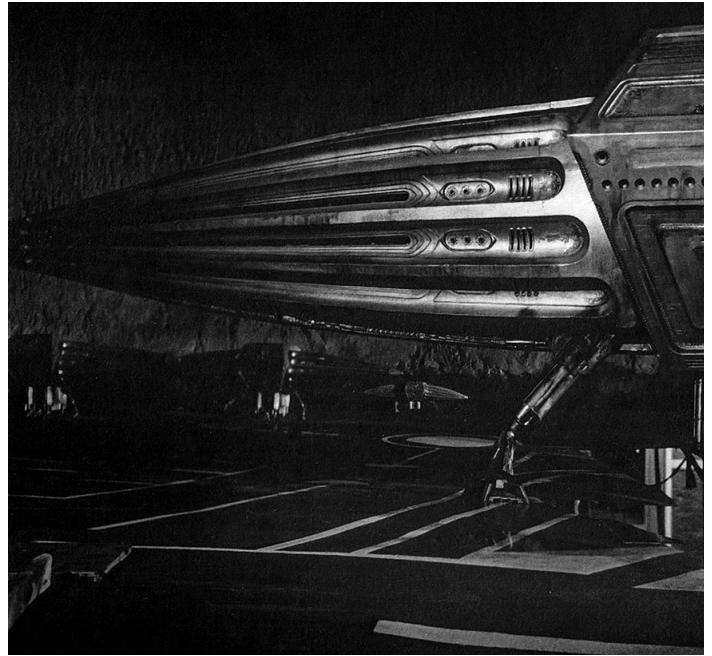
Using a technique and location that w during *Dune's* principal photography, R set up the Guild ship hanging miniatur camera on a thirty-foot high platform sit Mexico City's Azteca Stadium — one of t in the world. The under-section of the Gu measured thirty-five feet by twenty-five rated part of a miniature landing field feet in front of the camera on a stee portraying the leather-clad first-stage then stationed 250 feet away on a full-sc ship that included a landing ramp and s using a deep-focus lens to hold a consi foreground miniature, background ful were all blended together, without the n opticals.

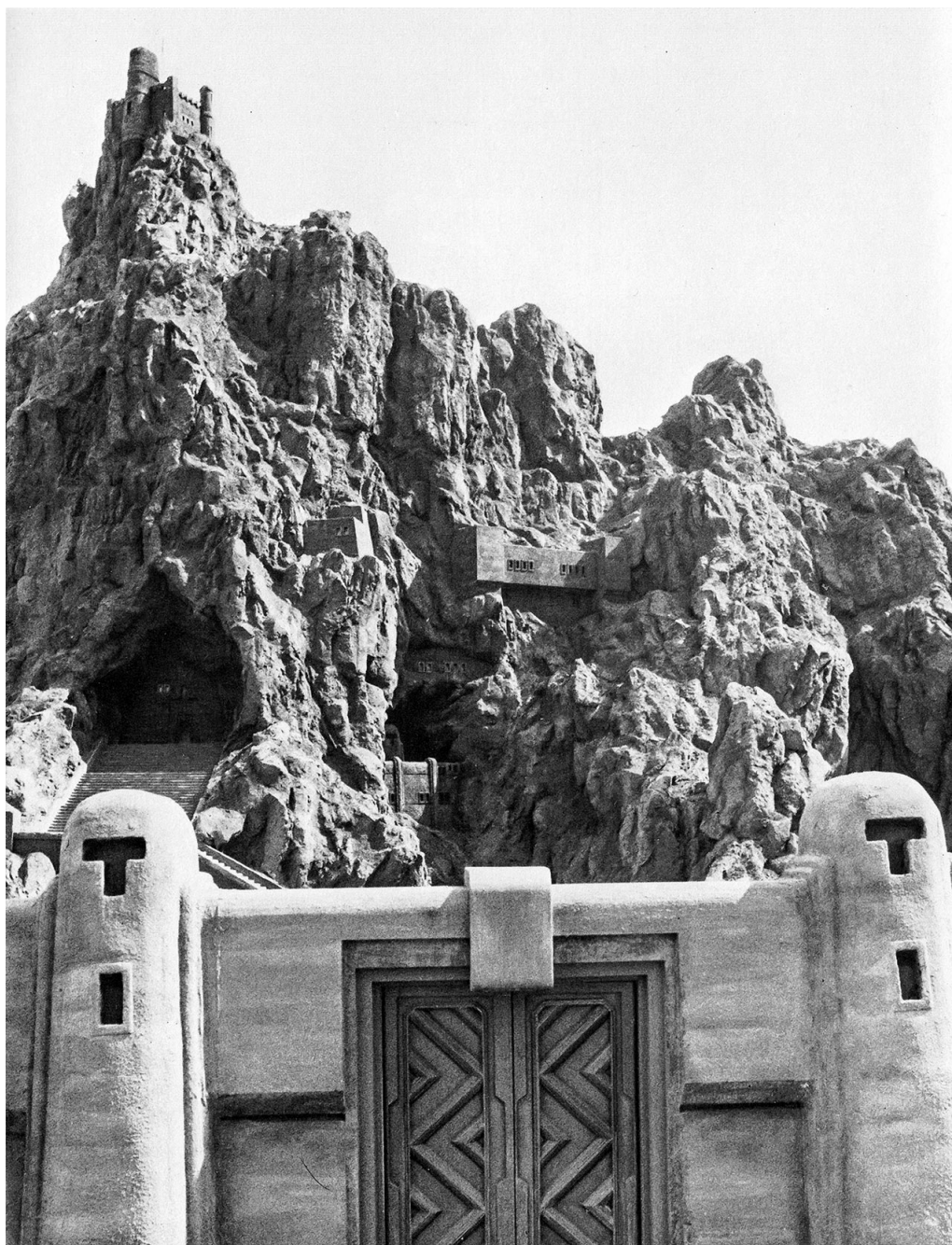
Also unique in design and concept w ships. First revealed in scenes on the pla Leto and his supporters are preparing to for the barren, dune-covered planet o

depicting the mythology of that Empire — battle scenes from the early days of conquest, old emperors and the like. All of that ornamentation was done by Christine Overs. The panels around the door were plasticine. The ornamentation itself was done right on the clay sculpture, with bits of lace, paper doilies, plasticine carvings, and all manner of little knickknacks and cheap bits of jewelry. Then it was cast in fiberglass and spray-painted gold. The detailing on that paneling was very impressive — Christine even had the British Raj riding on the back of an elephant in there. Using the most mundane of materials, with great flair and imagination, she turned an earlier concept — which involved plate or etched glass and would have looked very tame and boring — into one filled with magic and imperial grandeur." Once inside the heighliner, the Atrides ships are seen being secured at the docking platform, a six-foot by five-foot fiberglass structure built by Gus Ramsden and equipped with a half-inch motorized rod attached to the back of a twelve-inch ship model. Shot at high speeds, the rod retracted the model into its docking position.

After voyaging to Arrakis in the Guild heighliner, the Atrides ships touch down on the Arrakeen landing field, making way for yet another of Emilio Ruiz del Rio's hanging miniatures. "For this shot, we had an Atrides ship model — thirty feet long by ten feet high — in the foreground, and eight other six- by three-foot Atrides ships in the background. There was also a wood and plaster section of the shield wall that stood behind all this, thirteen feet high and nineteen feet long. Surrounding the big foreground ship were about 1300 miniature soldiers, about a third of an inch high. And supporting all this was a miniature airfield, painted with white landing zones, that measured fifty-four by thirty-six feet. This whole big miniature — the ships and the soldiers and everything — was then put up on a platform thirty-six feet in the air, where we also put our camera. To make the shot work, we had to combine our miniature ships and landing field with real soldiers and the real actors. So on a parking lot at Churubusco, a set about forty feet high was constructed which was meant to be the lower part of the big foreground Atrides ship model. This full-size set had a door, stairs and big columns on either side that were supposed to be part of the ship's engines. We put the actors on and around the stairs, set up our miniature set and camera platform about three hundred feet away, and then tilted the camera so that the real set was framed in between the lower, cut-out portion of our miniature. That one shot took weeks to build and set up. Even so, it was an inexpensive way to get the effect. The Atrides arrival on Dune is now very big, very grand. And it is almost all done with miniatures."

Duke Leto and his cohorts exit their ship in a flood of bright light and heat shimmer, and immediately enter the mountain







with the rest of the film."

Due in part to the reduced light levels caused by the dense smoke environment on Stage 2, it took a considerable amount of time to record the multiple passes required for the initial Face Burner shot. "David wanted this long, slow track-in on the processor," said Bohanna. "Each time, the camera had to move in only about four feet, but the motion control unit needed about ten separate twelve-minute passes to do it." As difficult as it proved to be, the Face Burner was only one component among many in the murky Giedi Prime sequence. Another was a model of the city itself — an industrialized maze of girders and cabling which resembled a futuristic oil refinery. The twelve- by sixteen-foot modular structure — pieced together from dozens of smaller panels cast in polyester from silicone molds — was sculpted by Gus Ramsden, with painting and detailing done by Ramsden and Danielle Verse. The fabrication and final assembly took five weeks to complete, and the model was illuminated with 150 pea-bulbs scattered throughout the structure and with green-gelled spotlights casting light from behind.

The Giedi Prime model was positioned in front of a small blue screen for a shot in which the city, the smoking Face Burner and various lights were composited simultaneously, along with an additional miniature — a small cable car. Although the cable car which actually stops within Giedi Prime was a full-size prop, a much smaller one was used in the establishing composite. "I built a cable car about eighteen inches long by six inches high," Bohanna explained, "which took about three weeks of work. It was made out of wooden patterns, glass moldings, EMA plexi-glass sections and a tiny bit of widgeting, or kit-bashing. Inside, there was a wood and cloth doll, about four inches high, that my little boy made. It was an amazing job, very lifelike."

The miniature cable car, lit by 400 watts of incandescent bulbs, ran along a thirty-foot-long aluminum girder three inches thick. An electrically-powered winch, pulley and counterweight, mounted on the camera-blind side of the car, provided the actual movement. "We shot the cable car against a blue screen, as a separate element," said British traveling matte expert Stanley Sayer. Sayer, whose career began in Technicolor's titles department, and who spent forty years with that company, is a major figure in the international bluescreen community. With an extensive body of work in such landmark effects films as *Raiders of the Lost Ark* and all three *Star Wars* episodes, Sayer would ultimately oversee approximately 150 bluescreen shots for *Dune*. "Most of *Dune*'s bluescreen work was done using four different kinds of screens. One was a very large front projection

Duke Leto and his entourage enter a full-size mockup of an Atreides ornithopter. / The vessel's takeoff and primary in-flight shots were obtained with a fully-articulated miniature constructed by Apogee. Effects crew members Tom Valentine and John Hatt adjust the collapsible landing gear in preparation for bluescreen photography of the takeoff. / Danielle Verse adds finishing detail on two smaller ornithopters, used for distant shots. / Brian Smithies does a quick on-set touch-up of the ornithopter's underside. / John Hatt rigs one of the small-scale ornithopters on a wire while the effects camera crew prepares for a shot of the 'thopter traveling over the shield wall. Subsequently, it was decided

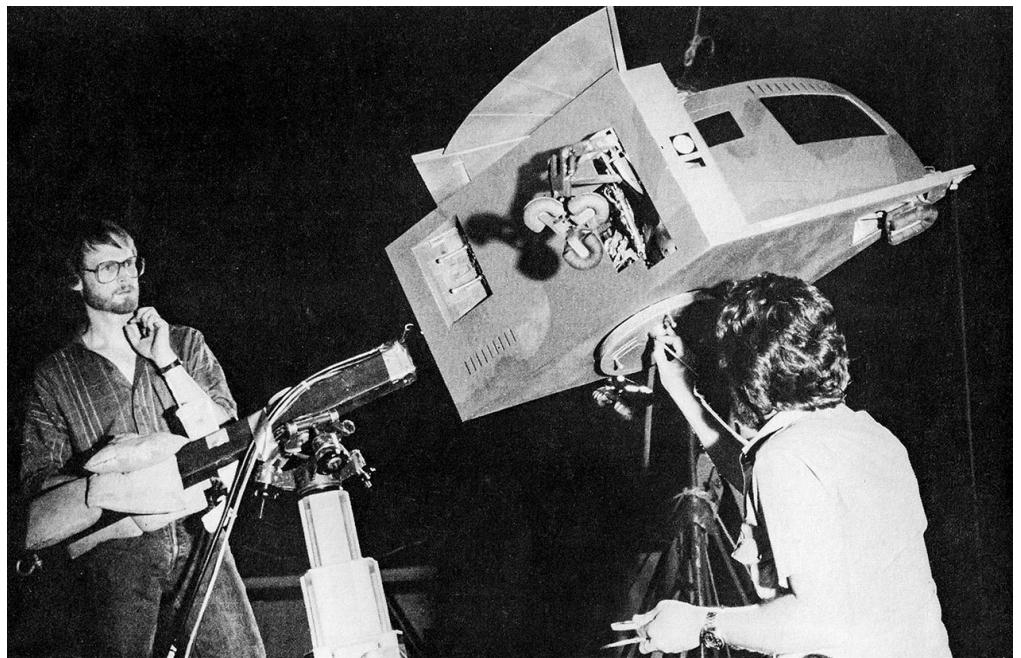


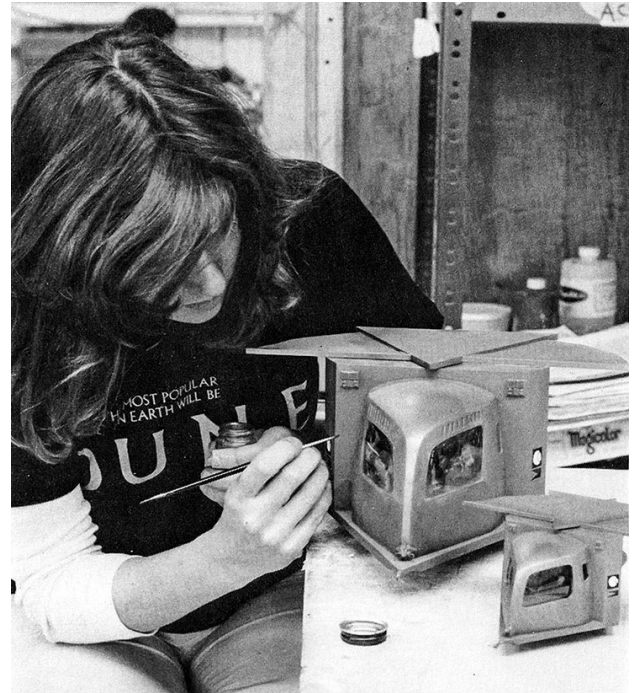
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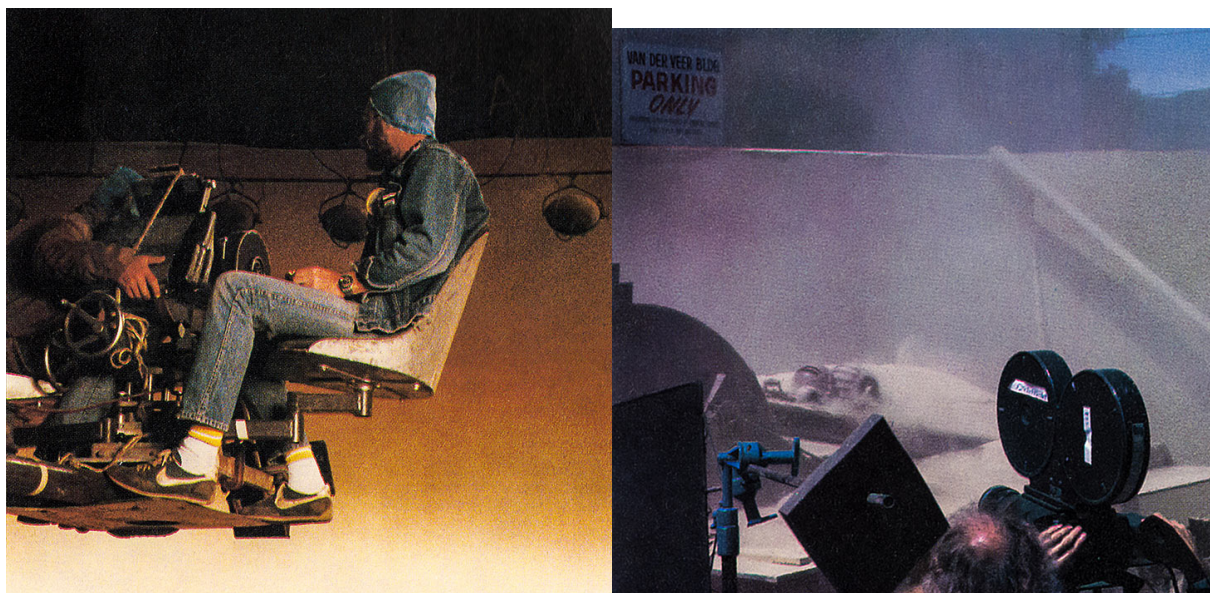
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Duke Leto and his entourage enter a full-size mockup of an Atrides ornithopter. / The vessel's takeoff and primary in-flight shots were obtained with a full-









boundary between cold and warm air. An additional smoke plume was simulated with a moving cotton shape. Both smoke elements were combined into a color matte film. In order to get convincing cloud shadows passing over the painted palace, a forced-perspective foam core mockup of the palace, the mountain and the shield wall was photographed with several different-speed shadow patterns passing over it, and this footage was then composited over the painting. The combined shadow, smoke and ship mattes ran in various combinations — both bi-pack and tri-pack — when the painting and artwork overlays were being photographed, and another bi-pack pass printed the burn-in exposure on the smoke layer. Finally, twelve more passes on the optical printer were required to add the blue-screen ships." A similar technique was used for the more distant Arrakeen valley shot, with the added employment of moving cotton shapes to simulate massive storm clouds visible over the top of the shield wall.

Paul's appearance before the Fremen multitudes in the Hall of Rites provided yet another opportunity for the Universal matte department to take a fairly simple setting and give it an enormous sense of scale. Live-action elements for the sequence were photographed at night in a long, narrow set constructed on one of the Churubusco backlots. "The original side walls of the set were twenty feet high," Bill Taylor recalled, "and the end wall was about eighty feet high. We added to all those walls in our mattes, which, for the high angle shots, were filmed with VistaVision and a 2-to-1 squeeze along the short dimension. The camera was turned sideways so that the long dimension of the frame was vertical, and we put some mattes in front of the camera to block out the areas we didn't want. Most of the crowd in the distance is painted, as is the ceiling. The final painting was photographed on original negative, with an optical tilt made later on CRI [color reversal intermediate] — a standard Al Whitlock technique for incorporating a zoom or pan and tilt." In all, three paintings were rendered for the Hall of Rites — each a collaboration between Syd Dutton and Albert Whitlock's son, Mark.

Mark Whitlock was also responsible for the final matte shot in the film — a distant view of the Arrakeen palace as Paul miraculously brings rain to the ever-parched planet of Arrakis. "That shot is a full painting," said Taylor. "We had a live-action plate of Fremen extras in a crowd, but it just didn't work out. What you see of the crowd is all painting — with certain areas scratched away and a moving backlit grid behind to create a bit of animation. We shot miniature cotton clouds in multiple

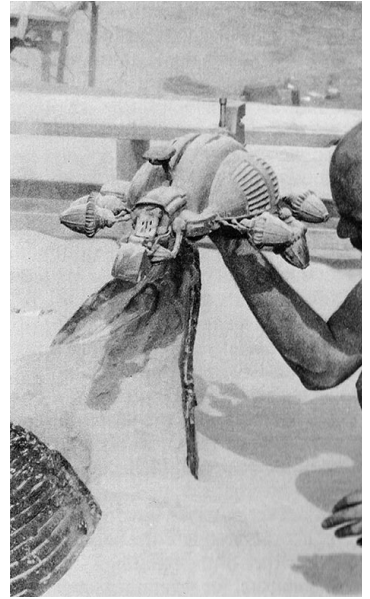
A monstrous set of worm jaws close about the abandoned spice harvester. / Between shots, model shop supervisor Peter Bohanna examines the diminutive spice harvester — constructed from beeswax to facilitate its being crushed by the giant sandworm. / For these shots, Carlo Rambaldi's twelve-foot mechanical worm head was positioned beneath the elevated miniature desert setting. A counterweight system enabled it to thrust upwards, while cable operators controlled the mouth functions. / As the worm breaches, high-speed cameras record the action. / Preparing for a shot of the large harvester, Danielle Verse spreads colored 'spice'

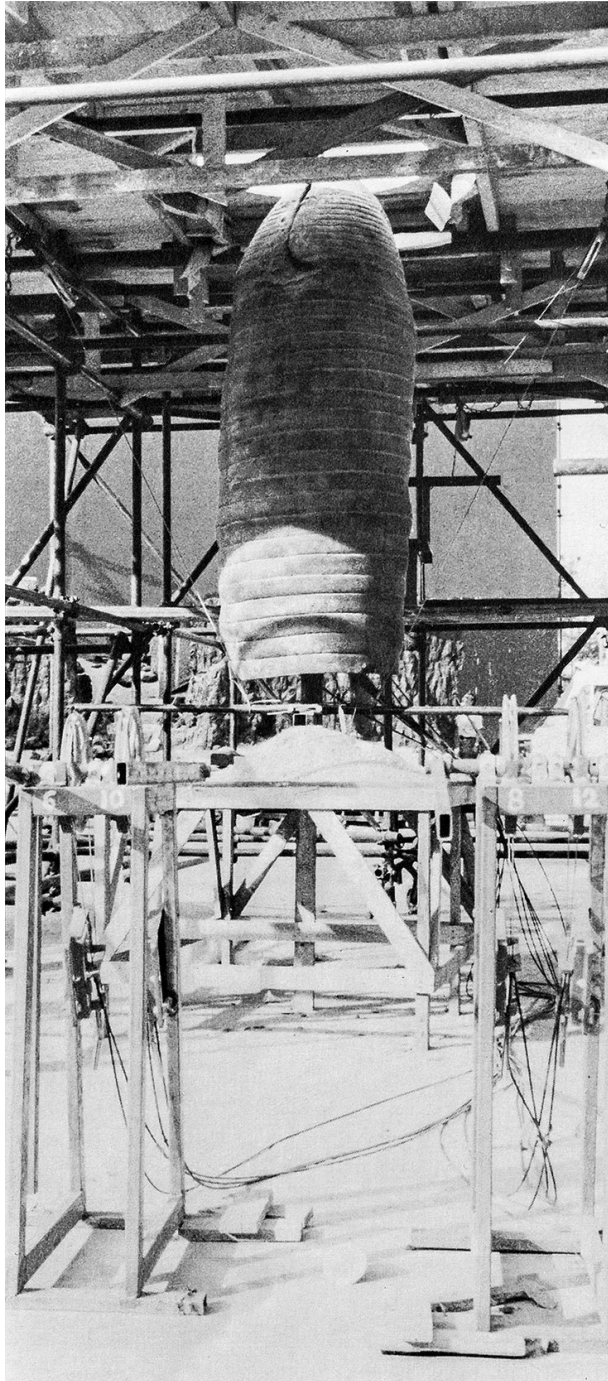


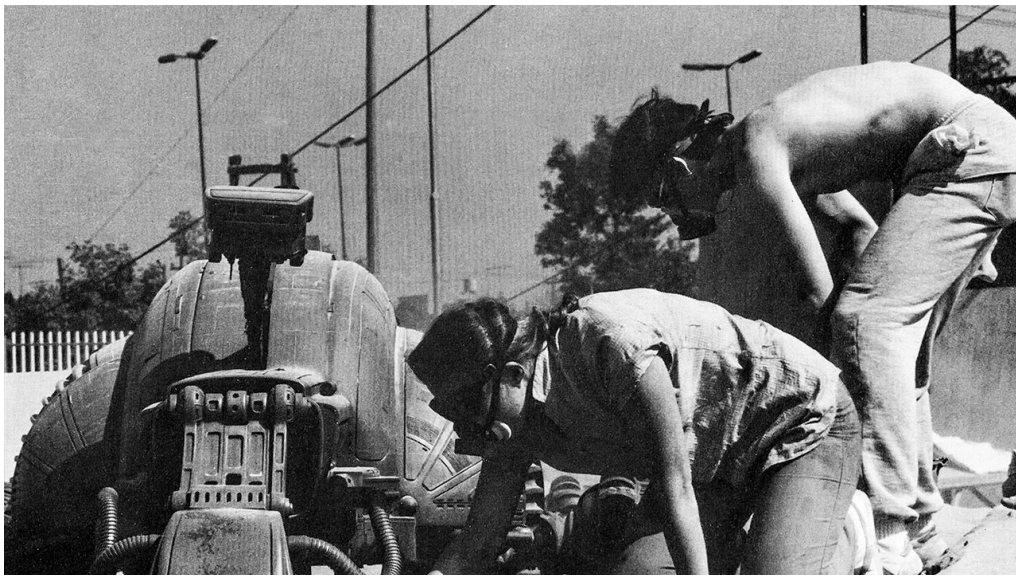
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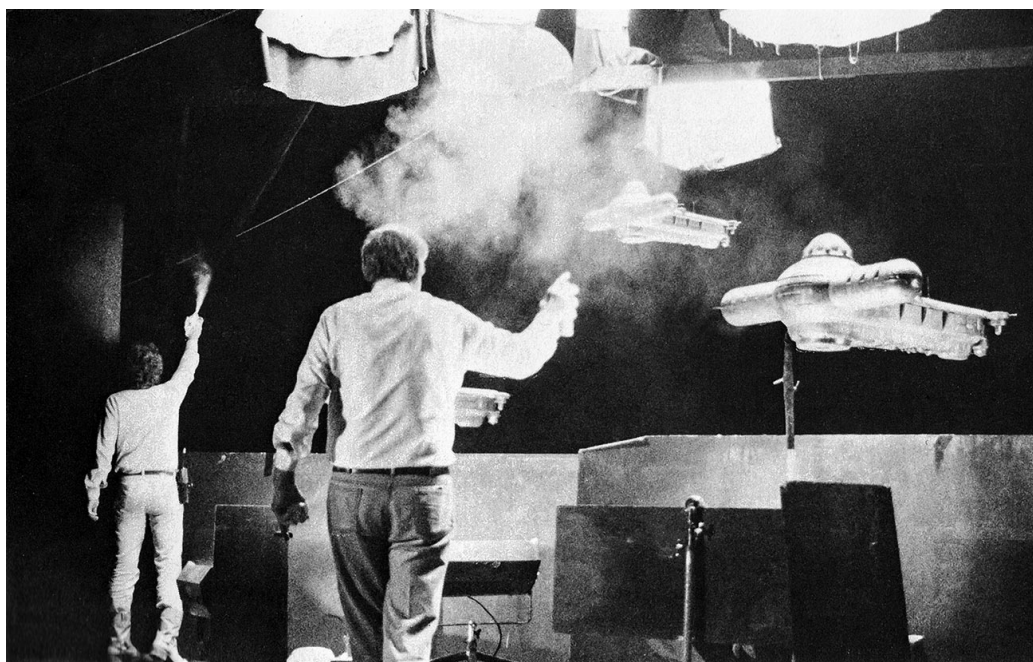
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Between shots model shown*

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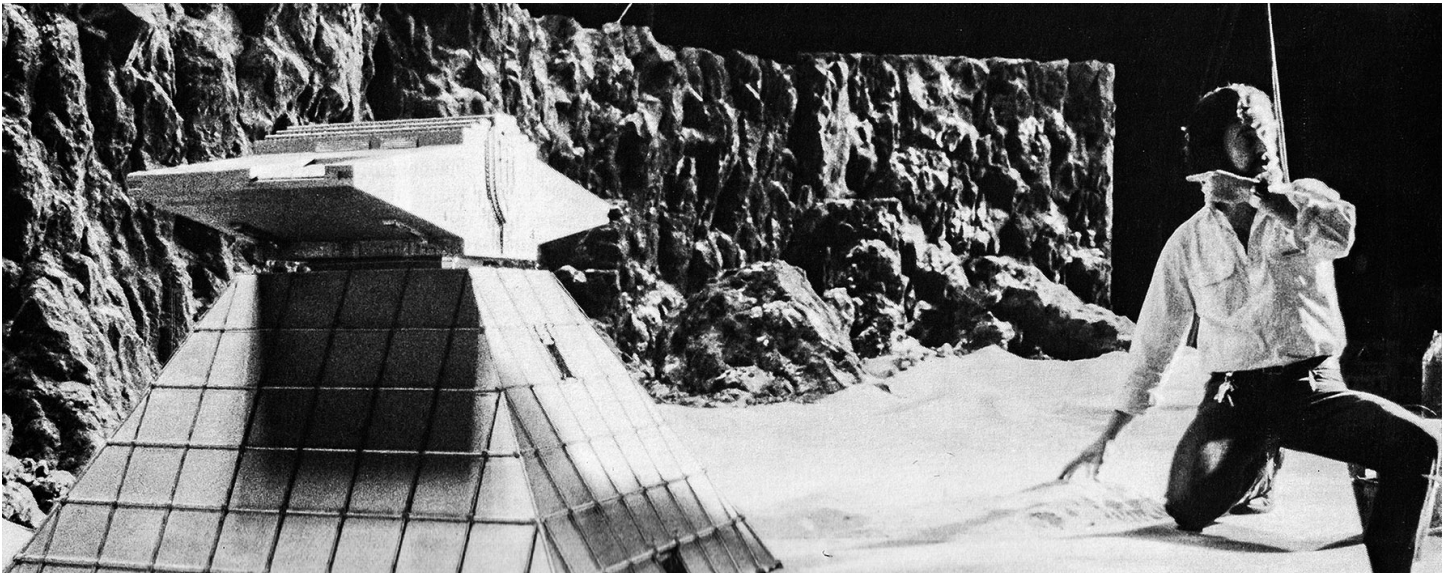
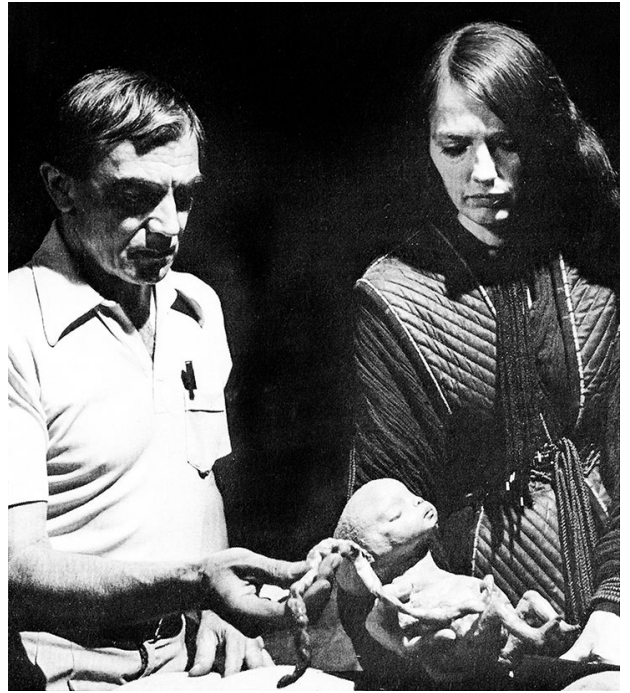


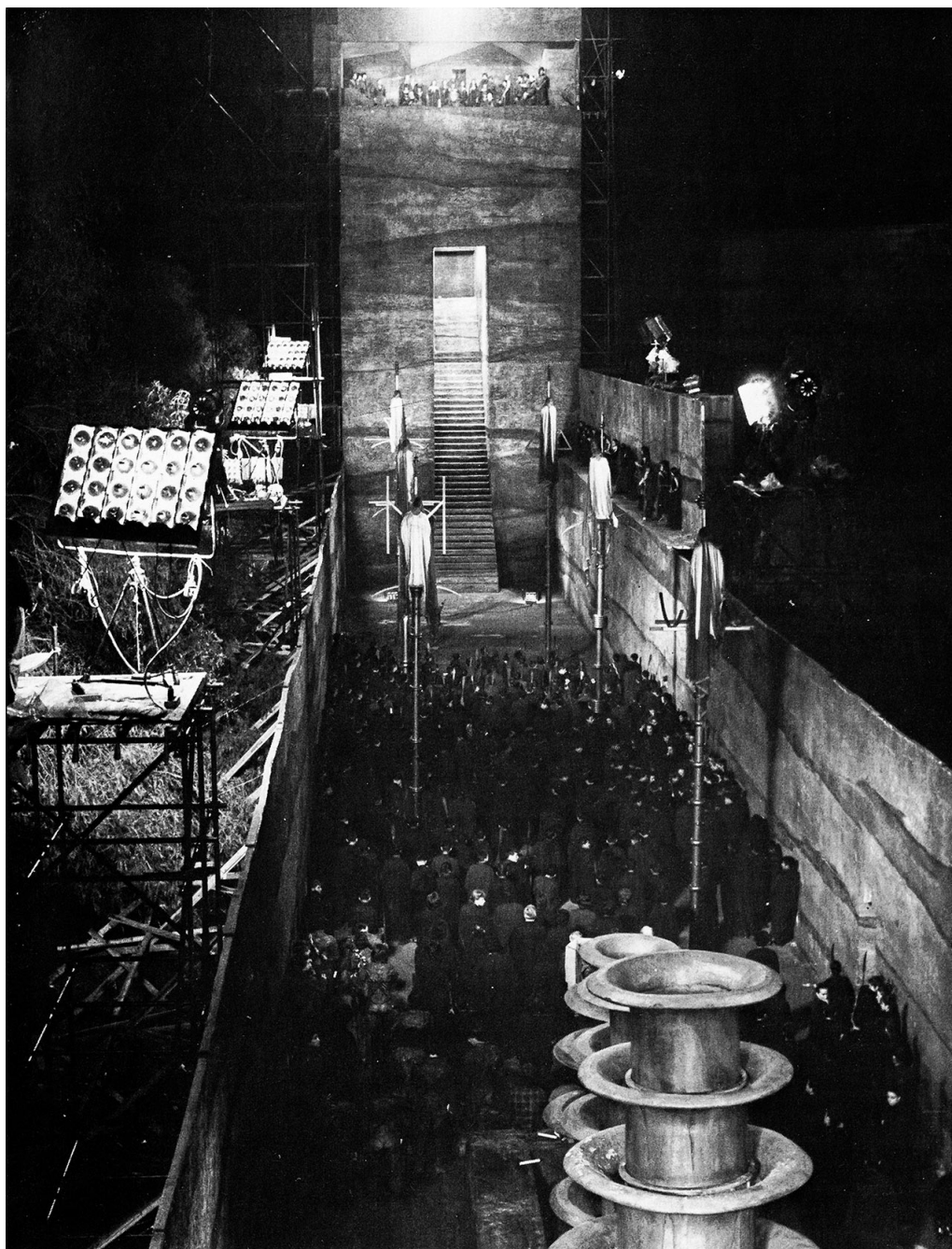


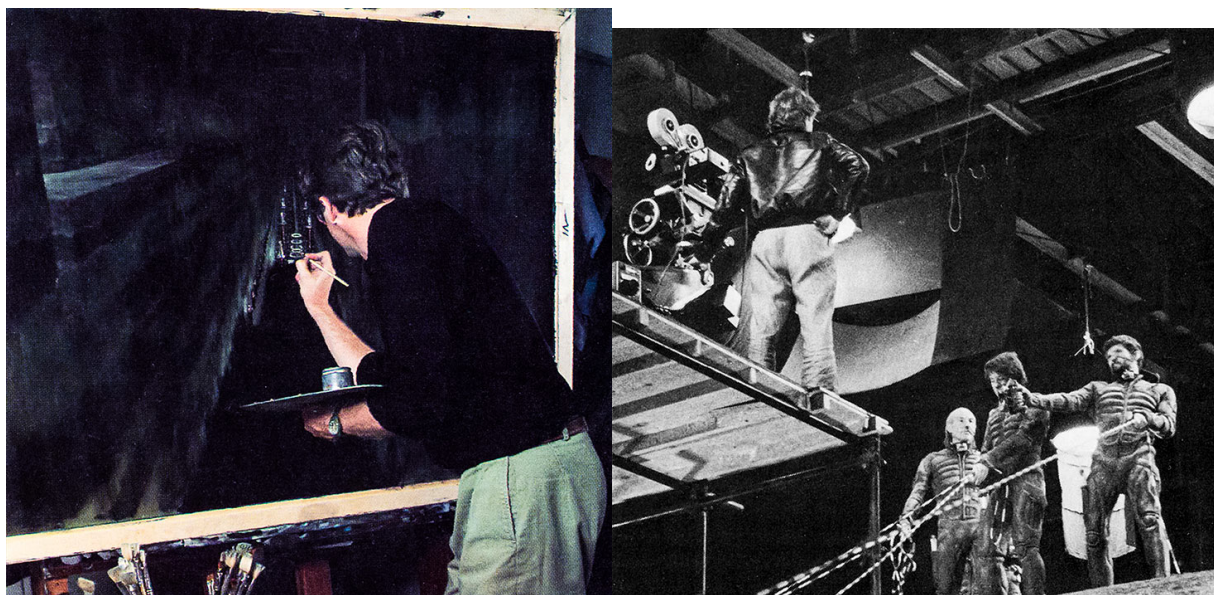










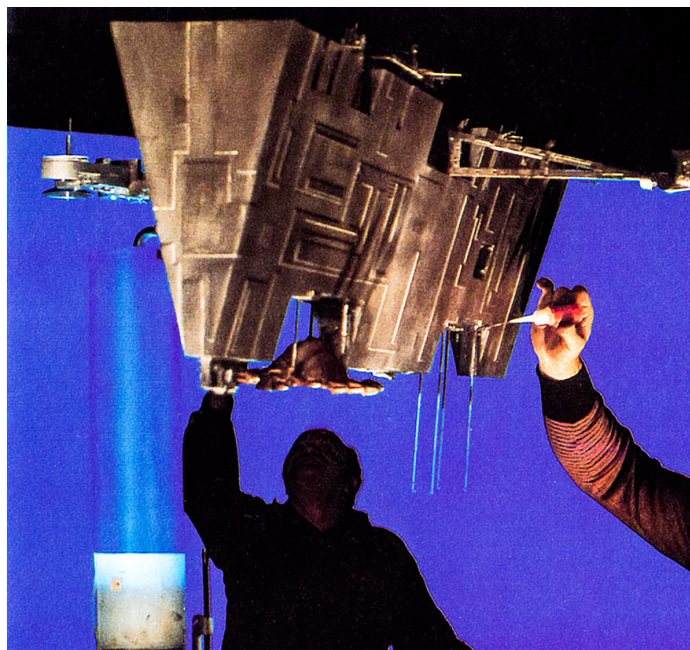


—but it eventually worked its way out of the picture. People just didn't understand what was happening."

Another recurring image was of an open hand. "People kept wondering what that was all about," Nolan continued. "Well, to begin with, that was my hand. David put in all kinds of little cameos and vocal appearances by people who had worked on the film. But what it was *supposed* to be was the hand of God — literally. That would have been more apparent had they kept in a scene that was dropped after the first preview. It was at the end of the film and this giant hand comes down out of the clouds over Arrakeen. A bolt of lightning shoots out of its palm, and it begins to rain. It was all supposed to be a symbol of Paul's powers."

Other imagery was less obscure. Early in the film, as Paul sleeps in his Caladan bedchamber, he has a disturbing prophetic dream featuring a stunning black-and-white image of molten light shifting across the face of dark water — a high-speed shot filmed at Churubusco in a large, specially-built tank lined with black mylar. Paul next envisions the cataclysmic explosion of Arrakis' mouse moon — so named because of the mouse-shaped silhouette on its surface. "For that shot," said Nolan, "we used a number of solid plaster moons that we hung up outside, twenty feet in the air. The faces had been prescribed into chunks and then reassembled. We used a Photosonics high-speed camera — shooting into a mirror for safety — and we just blew them up. There were a lot of takes — mainly because what we wanted were flameless explosions, which wasn't easy."

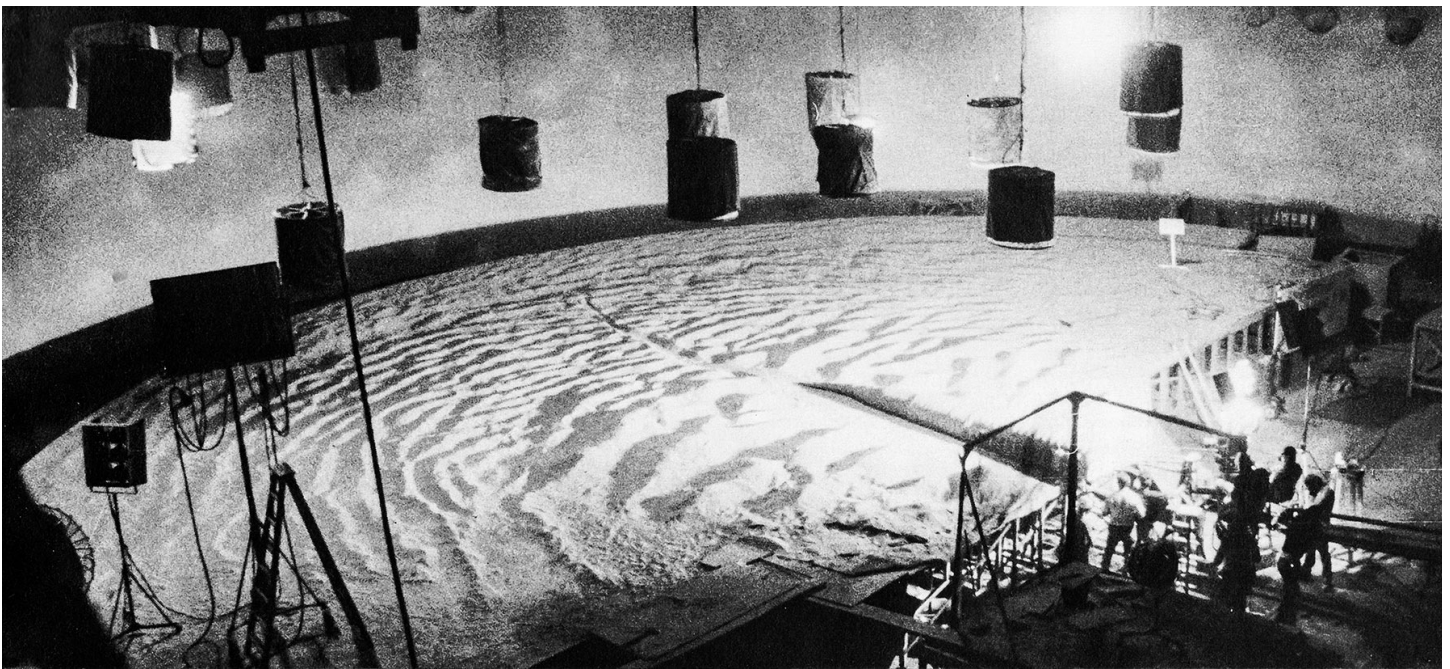
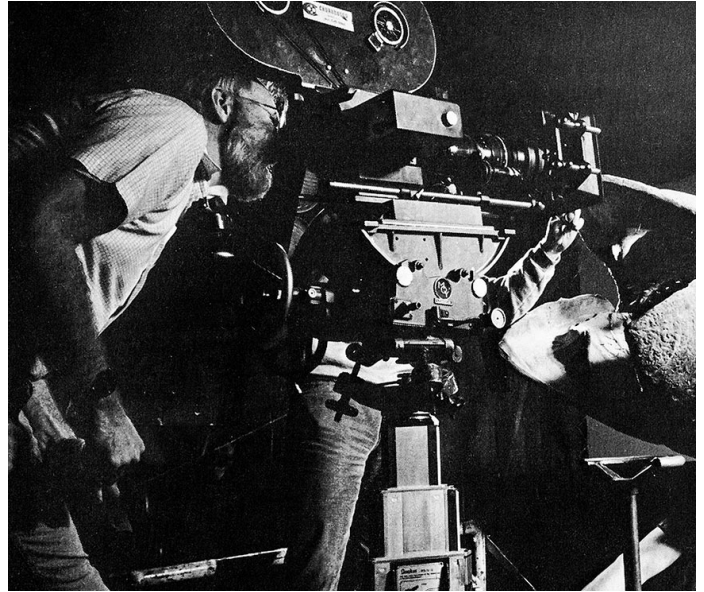
Requiring an even greater amount of production time — and considerably more effort — was *Dune's* personal body shield. First demonstrated in the knife fight between Paul Atreides and warmaster Gurney Halleck, the body shield is composed of impenetrable slabs of solid electricity — crystalline-like structures resembling a stylized suit of armor that is impervious to all but the *slowest* attempts to penetrate it. Although Apogee had shot motion control and bluescreen plates for the combat training sequence, Barry Nolan found that a considerable amount of reevaluation was in order. "We talked and talked and talked with David about the concept," Nolan recalled. "We did blow-up color prints of the people and sketched different shield ideas over them, trying to find a single-frame graphic representation of what David wanted in there. Then we did an animation test of a part of that scene, using a design David liked, burning a basic structure of the shield over the shot as it was. David really wanted a rigid-looking box, but it *had* to give a little. We went through this process until we developed the 3-D structure which



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powder blue white and a dark gun-metal blue iris — a totally blue eye. That wasn't easy. Again, if we went too far, the eyes would glow; and if we didn't go far enough, the eyes would just disappear. Each eye had to be wedged. And it wasn't anything we could evaluate on a light bench. We had screening rooms all over town that were balanced for color temperature and brightness so we could check our effect. If there was any sign of chatter or alignment problems, or if the color was moving around the eyes, we'd kick it out and do it over. Some of those eye shots were done four dozen times — most of them at least six — just to find the right visual combination. In all, there was a little more than twenty-five minutes of 'blue eye' material on the screen, with anywhere from one to twelve sets of eyes per frame. In the end, we figured out that we'd done about 136,000 eyes."

After three-and-a-half years of intensive labor, the David Lynch vision of *Dune* was drawing to a final wrap. "David was given carte blanche to make this film the way he wanted," Barry Nolan concluded. "They literally never said no to him. Raffaella said: 'This is a David Lynch film and I want him to make it the way he wants. I'm not going to block him every time he says he wants to do something.' So we did whatever he wanted. During the last phase of postproduction, David had his office right upstairs from us, and we spent a year working very closely together. I must have seen *The Elephant Man* a dozen times and *Eraserhead* half a dozen times, just to clue in on what he was as a man. It was a beautiful working relationship — no fights, nobody got fired. The film ended up with 68 minutes of opticals — just a hair over half the total running time. All told, there were 550 optical shots — and of those, I'd say that 75 percent incorporated original photography. So it was a big job — for everyone concerned. And with very few exceptions, we all walked away proud of what we had done."

Unfortunately, the phenomenal success of Frank Herbert's novel was not to be repeated in the first film based on his chronicles of Arrakis. In the wake of persistent rumors that *Dune* was in serious trouble, Universal released the film nationwide on December 14, 1984. Although it enjoyed a strong opening week, *Dune* quickly plummeted from the Christmas hit list and by February had grossed only \$25 million — less than half its cost, and far short of the estimated \$200 million needed to clear a profit. Despite the film's epic presence and inventive soundtrack, audiences simply found *Dune* too bewildering. Perhaps expecting the surface flash of *Star Wars*, they found instead a somber, complex attempt at serious science fiction.

Yet for all its boxoffice shortcomings, *Dune* remains a dedicated and reverent attempt to bring an intelligent, adult speculative novel to the screen. "No matter what happens ultimately to the film," concluded Frank Herbert, "David and Raffaella and

To avoid the inhalation of microballoons, filter masks were mandatory for all crew members working on the worm stage. / The closeup head is photographed against a blue screen. / A giant sandworm plows through the deserts of Arrakis. Blowing sand and black smoke — from burning rubber — were staple ingredients of the worm shots. / Even after the worm unit wrapped at Churubusco, an occasional insert would be deemed necessary. Here, a motion control camera on the Van der Veer effects stage is trucked toward the worm head — with moving smoke overhead suggesting stormy skies — for a battlefield POV of Sardaukar soldiers being run over by the giant creature. / For a scene of a worm diving into the sand,

